

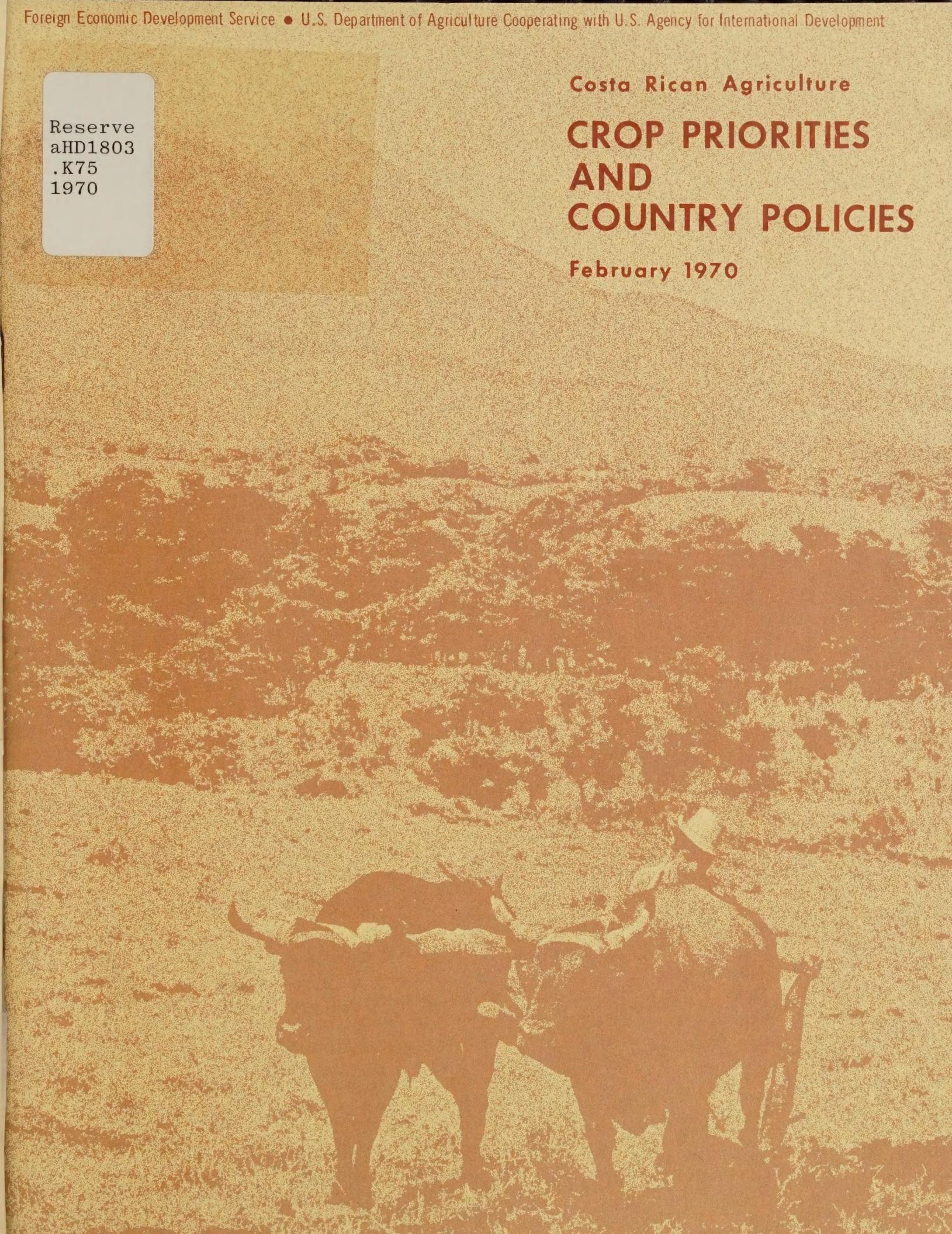
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Costa Rican Agriculture
CROP PRIORITIES
AND
COUNTRY POLICIES

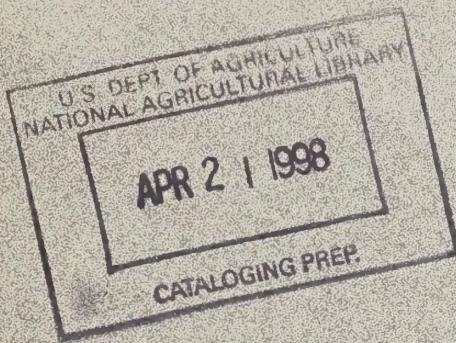
February 1970



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Costa Rican Agriculture

CROP PRIORITIES AND COUNTRY POLICIES

February 1970

Martin Kriesberg

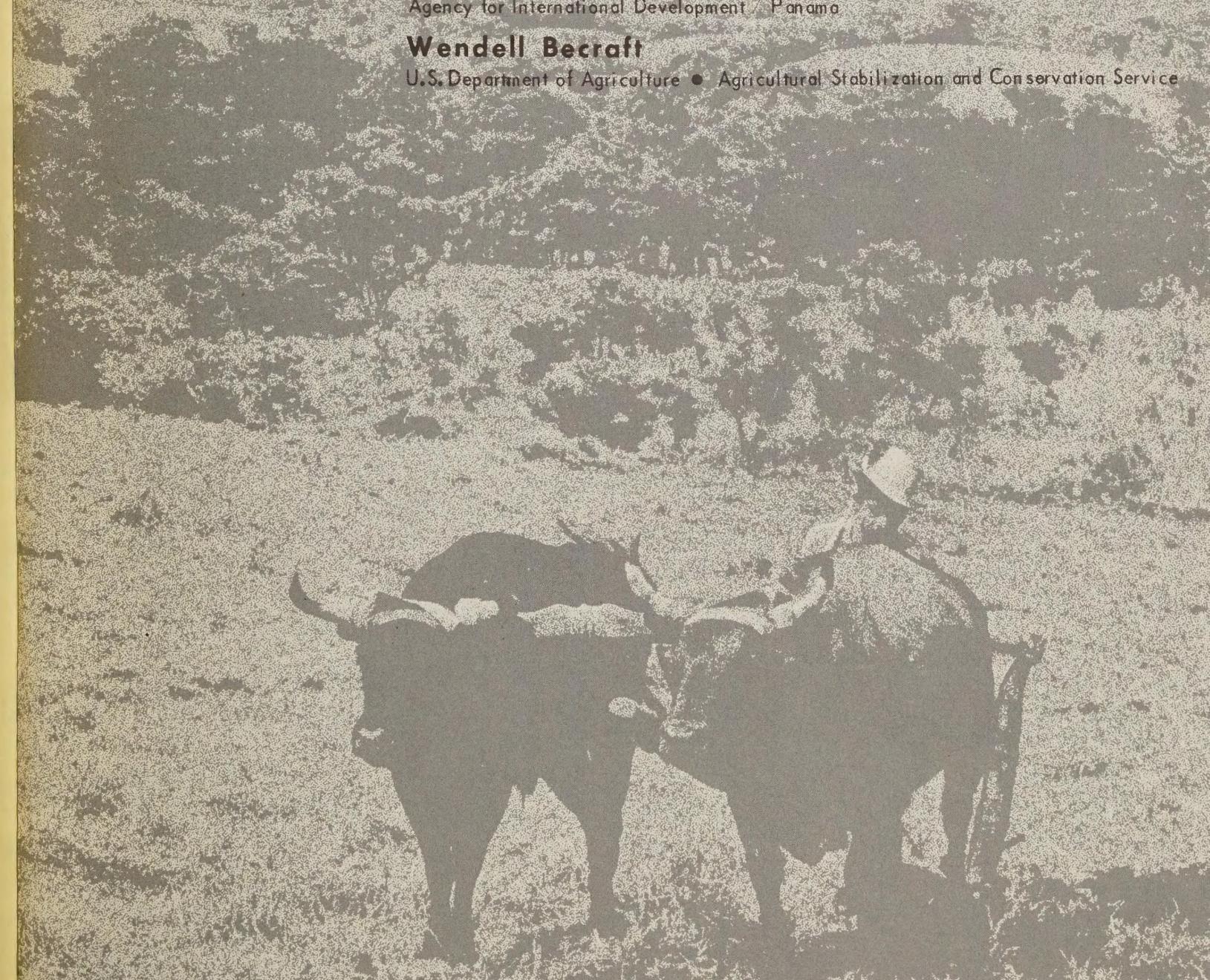
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In preparing the report, Kriesberg had principal responsibility for the proposed USAID strategy and on marketing; Bullard had principal responsibility on the production side. Becraft was primarily concerned with the section on basic grains and pulses; his paper on price stabilization and storage of basic grains is attached as an appendix; Byron Montgomery, Agricultural Attaché in Costa Rica, reviewed the section on meat and dairy products.

To all the people with whom we met in Costa Rica and who gave so freely of their ideas and counsel, we are most grateful. A list of those the team met with singly or together is appended.

COSTA RICAN AGRICULTURE: CROP PRIORITIES AND COUNTRY POLICIES

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COSTA RICAN AGRICULTURE: CROP PRIORITIES AND COUNTRY POLICIES
SUGGESTIONS FOR USAID SUPPORT OF THE AGRICULTURAL SECTOR

1. Background and objectives

The Aid Mission Director of Costa Rica requested USDA to furnish two advisors, one to be concerned with crop priorities, to make recommendations on what commodity programs should be supported by the Mission. Because marketing was viewed as a critical element in such an appraisal, the Mission asked if the advisor could cover this dimension as well. Martin Kriesberg undertook this assignment. USDA was also asked to provide assistance in evaluating the price stabilization program for basic grains and the agency concerned with this program in Costa Rica. Wendell Becroft undertook this assignment. To provide assistance on the production side, in evaluating crop priorities, Ervin Bullard was detailed from AID/Panama to work with Kriesberg.

The three men provided counsel to the Mission and to a Costa Rican economic planning group which was helping the Mission and the Government of Costa Rica develop the country's overall agricultural sector plan. The Mission and the host Government were making other studies as part of the material needed to develop the sector plan. The plan, in turn, was to be the basic document supporting an agricultural sector loan which was being proposed to AID. The team was asked to specify technical assistance requirements in connection with the recommendations made.

In making its report, members of the team were constrained by the limited scope and orientation of their assignments. For example, little is said about the institutions which would be needed to carry out the commodity priorities suggested. Little is said about the economic well-being or viability of the different agricultural regions with their individual cropping patterns. The interrelationship between farming and off-farm employment, the balancing of commodities to achieve reasonable levels of year-round employment, is thus touched on only indirectly. Other study groups set up by the Mission will deal with some of these issues.

Time available to the team did not permit rigorous cost/benefit analyses of the score of commodities which were considered in setting priorities. Kriesberg was in Costa Rica $3\frac{1}{2}$ weeks; Bullard 2 weeks; and Becroft 5 weeks, /but Becroft was primarily concerned with drafting the paper which is included in the appendix/. The statement that follows, however, indicates the considerations that were taken into account in arriving at the priorities suggested.

This report is limited to a discussion of agricultural sector strategy for Costa Rica and AID's support to make that strategy work. It takes into account the capital and technical assistance being provided by other international agencies and the on-going activities by the GOCR and private agribusiness organizations in the country.

In general, the orientation is that AID support should be limited to those areas of agricultural development where there is inadequate support from other sources inside the country or outside. Thus, the traditional export commodities with their strong financial and operational foundations, while of paramount importance to the country's economy, do not require AID support. On the other hand, the problem of small farmers, particularly in food crops, is receiving scant assistance from any quarter despite their importance to the socio-political development of the country. Rural workers too, though currently enjoying relatively good earnings in the large plantations, are vulnerable to shifts in the market for the major export crops. Little is being done to deal with the eventuality of large numbers losing such employment. AID support of the GOCR efforts on behalf of these groups is urgently needed as part of any overall agricultural and country development assistance program.

The current situation for Costa Rica's traditional export commodities has probably never been better; it would be pleasant to contemplate a continuing upward trend in supply and demand for Costa Rican coffee, bananas and sugar. However, these are crops grown in a number of other countries in this hemisphere and in other parts of the world, and the wide fluctuations in price as well as sources of supply is too well recorded for those concerned with Costa Rica's development to be complacent. This paper does not recommend diversification out of these traditional export crops. They are good earners of foreign exchange and provide a livelihood for many rural workers. This paper deals, instead, with means of diversifying into a number of other crops which may supplement the traditional exports and substitute for imports.

In line with the scope of concern assigned to this team, the approach is one of priorities among commodities. While the need for strengthening certain institutions and improving some institutional arrangements is noted, the discussions are largely limited to the specific commodity problems involved. It is anticipated that other papers being developed for the proposed agricultural sector loan application will deal with institutions at greater length.

II. Bases for Setting Crop Priorities

In setting crop priorities, it is useful to first identify the economic development objectives to which agriculture contributes. Sector plans should aim to optimize agriculture's contribution to three primary objectives: (1) helping to provide an adequate supply of food for all the people and at reasonable prices relative to incomes; (2) improving rural standards of living - including better income distribution; (3) strengthening the country's balance-of-payments position, i.e. producing commodities for export and for import substitution. The relative importance of these objectives and the ways in which optimization may be attained will vary among countries and within each country at different times.

A. Agriculture's Contribution to Economic Development

1. Providing an Adequate Food Supply for the People

One of the most basic responsibilities of a nation is to assure an adequate food supply for its people. While self-sufficiency in foods ought not to be a goal where it is uneconomic, governments are politically vulnerable if they are overly dependent on external food supplies. Following the world food crisis of 1966-67, most developing countries devoted greater efforts to provide for their food needs from increased production. Traditionally, when supplies were short, prices went up; the poor bought less or did without and supply and demand were balanced. There is now increasing concern for more adequate diets for all the people, even those who cannot afford to buy all the food they need at commercial prices.

The problem of more adequate food supplies is approached initially by efforts to produce more food grains and other traditional crops. But as adequate caloric levels are attained, attention needs to be focused on the quality of diets. Increased production of meat, fish and dairy products for animal protein is called for, as is the fortification of food grains with protein additives to increase possibilities of adequate protein in diets of low income groups.

From the consumer point-of-view, availability of food is closely associated with the prices they must pay for it. Most town and city people in developing countries spend a large portion of their income on food. Many might have more adequate diets if the cost of food relative to income were less. Besides better income distribution, adequate food may be made available more widely by supplemental or subsidized distributions to the poor and other vulnerable groups such as nursing mothers and small children. Efforts to reduce commodity losses in marketing and to preserve commodity quality would also contribute to more adequate food supplies.

2. Improving Rural Standards of Living

In Costa Rica 50 percent or more of the population earns a livelihood from agriculture. Because agriculture looms so large in the economy, it is important for political as well as for economic reasons that small producers be brought more fully into the mainstream of national development.

High returns to a few producers may meet production requirements but aggravate the problem of marginal farmers and rural workers. Hence, one of the factors to be considered in agricultural planning is the extent to which different commodities provide employment for rural workers.

The amount of work and earnings for rural people generated by a particular commodity is not determined solely by its production process. Some commodities, like bananas or artichokes, may require considerable labor in the growing process and additional labor may be used in field

packing for shipment to market. Other commodities, such as tomatoes and berries, lend themselves to processing in the areas where they are grown and to using rural labor in making products such as purees and preserves.

In efforts to improve living standards of rural people, consideration needs to be given to the terms under which they work the land. When a man owns the land he tills, he is encouraged to improve its productivity. Then, if returns from increased production accrue to him in large measure, productivity increases will mean more income.

3. Strengthening the Country's Balance-of-Payments Position

In Costa Rica, agriculture is the major source of foreign exchange earnings. While industrial growth has been strong in Costa Rica during the decade of 1960-69, agricultural exports have continued to be the backbone of the economy. Agricultural exports continue to account for 85-90 percent of all exports. The market for Costa Rica's traditional exports--coffee, bananas, cocoa, sugar (and now beef)--have been strong in recent years and this accounts for the nation's current economic well being. (Table I) Foreign currencies pay for the things it wants to import. Returns from agricultural exports are a principal source of capital for overall development. Moreover, agricultural

TABLE I

COMPARISON OF MAJOR EXPORTS FOR FIRST TEN MONTHS OF 1968 AND 1969

(In 1000 kilos and 1000 dollars)

	January-October 1968		January-October 1969		% Change in Value
	Kilos	Dollars	Kilos	Dollars	
Meat	12,389	10,346	12,403	10,941	+ 5.8
Bananas	441,205	36,094	565,717	46,089	+ 27.7
Sugar	55,198	6,325	54,324	6,506	+ 2.9
Coffee	61,473	49,605	59,543	48,693	- 1.8
Cacao	4,618	1,998	7,654	5,955	+ 198.0
Fertilizers	49,908	4,233	39,711	2,879	- 32.0
Other	<u>124,450</u>	<u>45,501</u>	<u>115,554</u>	<u>46,217</u>	+ 1.6
Total	749,241	154,102	854,906	167,280	+ 8.5

Source: Tabulated from Dir. Gen. de Est. y Censos, Comercio Exterior printouts and preliminary data for September and October 1969.

exports are taxed, thus contributing to operating revenue for the GOCR as well.

The contribution of agricultural exports to a better balance-of-payments position may be made in different ways. Increased efficiency in production and marketing of traditional export crops such as bananas, cocoa and sugar or the supplementing of these traditional exports with others such as tropical fruits would significantly improve exchange earnings. Production for import substitutions are another way agriculture may affect the balance-of-payments favorably. Balance-of-payments position might also be improved if commodities were sold under better terms of trade and this may be achieved by improving the balance between supply and demand, or by agreement between importing and exporting countries.

B. The Special Situation of Costa Rica

Costa Rica is different from many Latin American countries in how its agriculture may contribute most to the Nation's economic objectives. Costa Rica is also different from its larger partners in the Central American Common Market, Guatemala, Nicaragua and Honduras. Hence the bases for setting crop priorities here are not the same and the resultant agricultural development strategy is unique in the area. The key words in the strategy are "intensification," "innovation" and "integration."

1. The Need for a Land and Labor Intensive Agriculture

While Costa Rica is endowed with a wide range of soils and climatic conditions so that it may have a diversified agriculture, the amount of good crop land is small in relationship to its burgeoning population. Of an estimated 1,500,000 hectares of land suitable for cultivation, 900,000 hectares are in pasture, about 190,000 hectares are devoted to the growing of coffee, bananas, cocoa and sugar, the country's traditional export commodities. The remaining land, about 400,000 hectares, is now largely in basic grains (corn, rice, sorghum) and in beans, potatoes and other vegetables. This is the land and these are the crops which provide most of the Costa Rica's food supply. From these crops the large proportion of Costa Rican farmers earn their livelihood. It is on these lands and among these farmers, particularly, that a more productive, more intensive agriculture must be sought.

There are a number of ways in which crop land in Costa Rica may be used more intensively with associated increases of labor inputs and returns. For small family farms this means fuller use of lands available for farming and a reduction of disguised unemployment and under-employment in rural areas.

a. Higher-Yielding Varieties

Yields for most of the food crops (except bananas and sugar cane) are very low. Average production per acre of corn is 1,000 lbs. (U.S. average 4,300) and Costa Rica experiment stations achieve

6,000); beans average 640 lbs. (U.S. average 1,200 and Costa Rica experiment stations achieve 2,980). Improved seeds, more adequate use of fertilizer and pesticides, better control of weeds and simple water conservation measures require more labor per hectare, but the returns are likely to offset added cost several-fold.

b. Multiple Cropping

Because climatic conditions in many parts of Costa Rica permit crops to be grown the year around, multiple cropping is possible in many areas. Two crops of corn may be grown in many areas of the Meseta Central; two crops of rice and sorghum may be grown in Guanacaste.^{1/} The additional crop may be handled with the same number of workers more fully employed during the year or by the farm family with little extra help.

c. Successive Plantings

Some crops such as deciduous trees take several years before they become productive; other crops grow better in shade which may be provided as trees are growing up. Hence plantings of yuca may be introduced along with macadamia trees. In other instances, different crops are complementary in the use of soil nutrients and may be grown in succession. For example, corn, beans and sorghum may be grown in combination.

2. The Need for Higher-Value, Innovative Agriculture

Although Costa Rica has scant land resources, the people are progressive and industrious. Hence there is need to place a high value on land and labor committed to the Nation's agriculture. Intensive high-yield farming is one way of achieving a high return on the use of land and labor. Another way is to be selective among the alternative crops which may be cultivated. In coffee, bananas and sugar, Costa Rica has attained high value for its land resources. Coffee, for example, provides a higher rate of return per hectare than almost any crop which could grow in the same areas of the country. Another example of a high-value crop is flowers; returns per hectare of flowers exported are estimated to be as high as coffee. Other potential high-value crops are mushrooms and strawberries.

Another way of achieving high-value agriculture is by cultivating crops which lend themselves to field packing or processing. Field packing increases labor input and increases the value of the commodity at the time it leaves the farm. Field packing of bananas and of strawberries accomplishes this. Processing, of course, may increase the value of a crop to the Nation's GNP many times its farm-gate value. Thus, palm

^{1/}Other possibilities: rice and sorghum; tobacco and corn, coffee (shaded) plantation; palm oil/cattle; corn and beans.

oil plantings with on-site processing into oil adds greatly to the crop's value.

Still another way of getting higher value from the Nation's agriculture is by fuller utilization of the crops harvested. Of course, the utilization of livestock carcasses in the manufacture of by-products is well known, and milk is processed in many forms. Crops may be used more fully also. Thus, cassava may be used as food, and also for the production of starch and glues. Bananas, unfit for export or domestic food consumption, may be used as part of the rations for hogs. Sugarcane bagasse is useful as silage for livestock. Coffee residue is rich in protein and may be processed as part of feed rations.

Agriculture has been viewed in too traditional a fashion too long and particularly in developing countries. Costa Rica is at a stage in economic development where it can be much more innovative, not only in production practices but in the overall utilization of its agro-industry resources.

3. The Need for CACM Participation

The third key word in the proposed agricultural development strategy for Costa Rica is "integration" -- or more precisely, participation in the Central American Common Market. We believe it is to the economic advantage of the country (as well as the region) that it cooperate as fully as possible in making the CACM work. The agricultural strategy suggested here is premised in part on the continuing viability of the CACM and the protocol of Limon affirmed in 1964.

Among the principal benefits which the country derives from its participation in the CACM are the following: (1) assurance of supplies of some basic food crops, namely corn, beans and eggs, to make up domestic production deficits at reasonable prices; (2) encouragement of more external investment for agricultural and industrial development. Traditional political stability and high literacy rates in Costa Rica make it the most attractive place for businesses interested in the Central American market. Experiences of recent years have underscored the value of both of these benefits to the Costa Rican economy.

As a CACM trading partner, Costa Rican policy might well be aimed at being a net importer from the region, particularly on beans. This would be offset by expanded and diversified exports to other regions of the world arising from an emphasis on higher value of commodities, increased processing and greater industrialization generally.

C. Summary of Crop Priorities

This report makes recommendations for technical assistance needed to carry out the agricultural sector strategy outlined and the crop priorities listed below. The team recognizes that all of the scientists and technicians suggested cannot be funded out of the proposed loan; grant funds should be sought for the additional men needed. Most of

them would provide only part-time services at the country level, with the remaining time devoted to similar work for the Central American region. Regional Office for Central America and Panama financing should be available for this. Others might be handled by TDY under a university contract or PASA arrangement.

Priorities for USAID Support of the Major Commodities in Costa Rica
(and some problems faced)

<u>Commodity</u>	<u>Priority</u>	<u>Problems</u>
Pulse Basic food	High	Introduce or develop disease resistant varieties. Herbicide and fertilizer trials. Insect control, storage, marketing and credit.
Corn, Sorghum and Millet Basic food/feed	High	Insect disease and weed control. Double cropping. Fertilizer trials. Marketing, storage and credit.
Fruit and Nut Crops and Specialty Crops Potential for foreign & domestic marketing	High	Introduce and test foreign varieties and high yielding disease resistant selections. Insect and disease control. Fertilizer and spacing trials. Food technology research.
Vegetable Crops Domestic foods- subsistence crops	High	Disease, insect, nematode and weed control. Variety, fertilizer and spacing trials. Rotation and double cropping. Marketing, packing, grades, standards and transport. Food technology research.
Oil Crops Oil import substitution food/feed	High	Variety testing. Weed, disease and insect control. Spacing and rotation experiments. Use of by-products research. Credit and marketing.
Forage Crops Basis for beef & dairy industry improvement	High	Introduction of grasses and legumes. Fertilizer trials. Silage, hay and seed production.

<u>Commodity</u>	<u>Priority</u>	<u>Problems</u>
Poultry ^{2/} Important protein source-import substitution	High	Lower feed grain costs. Research on feed mixes using local products.
Hogs ^{2/}	High	Lower feed grain costs. Feeding trials with reject bananas and yuca. Better processing and marketing.
Beef Cattle Adequate support from local and external sources	Medium	Forage for the dry season using silage, hay, improved management, mineral supplements. Sanitation control in packing plants.
Dairy Cattle Adequate support from local and external sources	Medium	Forage crops, silage, hay for dry season. Herd management improvement. Import semen from proven bulls. Research in dairy products manufacture.
Bananas Adequate support from local and external sources	Low	
Sugar Cane Adequate support from local and external sources	Low	Insect, disease and herbicide trials. Bulk handling and storage.
Coffee Adequate support from local and external sources	Low	Fertilizer and shade interaction experiments. Diversification and fungus control. Mechanical harvesting.
Cotton	Low	Insect and weed control. Diversification, fertilizer and variety trials.
Rice Production adequate for market demand	Low	Variety trials, insect control, storage and marketing. Fertilizer trials, irrigation and double cropping.

^{2/} These are the most economical sources of animal protein and the most susceptible to increasing supplies for the near term. Moreover, Costa Rica imports \$725,000 in eggs alone (1968) and more than \$1.2 million in meat products. But increased production of hogs and poultry depends on increasing supplies of feed and bringing their costs down to the hog and poultry producers.

III. Priorities in Agriculture for Balance-of-Payments Purposes

A. The Traditional Export Crops

The situation in Costa Rica for the production and marketing of its traditional export crops of bananas, coffee and sugar has seldom been better. The production of cocoa has lagged, but market prospects have improved in recent years.

1. Bananas

It is expected that world production of bananas will continue to increase, mainly because of expansion of crops in most of the producing countries. The rise in production will exert pressure on prices. In all instances, countries having efficient production technology will be in a good competitive position, particularly if they have an adequate marketing system. Costa Rica qualifies on both these accounts and hence, Costa Rican production is likely to show a high growth rate. It is estimated that, during the 1968-1972 period, the average cumulative annual growth rate will exceed 10 percent. Costa Rica's share of world banana supplies is likely to increase during these years.

The rapid development of banana production is determined by several factors, including the following: planting of new disease-resistant and more fruitful varieties, thanks to which banana plantations have again been established in the low Atlantic area which has very fertile soil. The use of fertilizers is widespread, as well as programs designed to combat plagues and diseases. All of the aforementioned factors, combined with other improvements in production technology, have contributed to the achievement of yields of approximately 30 metric tons per hectare--among the highest in the world.

The various banana export promotion campaigns carried out in Costa Rica have furthered improvement of the transportation system and of marketing procedures. These improvements have affected not only bananas produced by companies but also those grown by independent farmers. The export companies provide a rather dependable market for producers through the conclusion of contracts for purchase of banana production at a given price, which fluctuates from US\$0.80 to US\$1.50, f.o.b., per box of 40 lbs. net, depending on contributions of the companies in the form of technical assistance and other inputs such as the provision of boxes on loan to farmers. Conclusion of contracts of this type for periods of approximately 10 years has facilitated the granting of loans to farmers, particularly by the national banking system, as farmers are more sure to sell their production.

Rapid expansion of the volume of foreign trade of Costa Rica is beset by problems pertaining to insufficiency of communications facilities and the inadequate capacity of the country's ports for handling a larger volume of cargo, which delay shipments and increase transportation costs. The country's transportation problems limit expansion of Costa Rican exports.

Rising banana production will provide a major thrust for expansion of the agricultural sector. It is estimated that in 1970, the value of banana exports will exceed that of coffee exports, and that they will become the major export product of Costa Rica.

The damage suffered by the banana plantations when the recent hurricane struck Honduras is a factor which will help to immediately strengthen demand for Costa Rican bananas.

2. Coffee

Costa Rica's coffee production is limited by the provisions of the International Coffee Agreement with regard to the size of its export quotas and the low prices at which coffee is usually sold in markets not covered by quotas.

Despite these limitations, Costa Rica has successfully applied technology to production by growing high-yield varieties, using fertilizers and weed-killers, applying new systems for pruning, increasing the density of plantings, etc. All these measures have enabled the country to achieve production of approximately one metric ton per hectare, one of the highest yields in the world. Efforts have also been made to cultivate the bean properly in order to achieve high quality.

The 1969 coffee crop was affected by rainfall during the harvest season so that the volume produced fell below expectations. A short fall is also expected in the 1970 crop because of the unseasonal January rainfall, during the dry season. This led to untimely flowering followed by a dry period in the central plateau which hampered growth of the beans.

Coffee prices on the international market have improved because of the frost which occurred in the northern area of Parana, which will reduce Brazilian production appreciably in 1970. Furthermore, because of failures in world production in recent years, it is expected that the prices will remain steady because the quantities of stored coffee surpluses have been dwindling. It is estimated that in 1971 and 1972 the country's coffee production will increase.

3. Sugar

Practically all of Costa Rica's sugar production is used for coping with the needs of the national market and for meeting the annual quota assigned to Costa Rica in the preferential U.S. market where prices are higher.

It is likely that sugar production in Costa Rica will rise gradually to meet both domestic and export quota needs. Since 1968 the world market price of sugar has been improving. Thus, if production

rises above that needed to meet local and U.S. markets, the excess may find other markets at reasonable prices.

4. Cacao

Production of cacao in Costa Rica has been tending downward in recent years for several reasons: world market prices have been depressed; production has been on small farms with little resources to improve technology and cope with fungi which has attacked some stands; other crops, such as bananas, have had better prospects, so resources have shifted away from cacao. While world market prices are up, production in Costa Rica will probably not increase materially unless more resources are devoted to improving production and marketing efforts.

* * * * *

The production and distribution of Costa Rica's traditional export commodities (except for cacao at present) are in strong hands. The large corporations and cooperatives principally concerned are adequately financed and well organized. They have resources available to assure a continued flow of high-yield technology for both production and marketing. For these reasons, the team has concluded that there is no need for AID Mission support in connection with these commodities.

B. Some Possible New Commodities for Export and for Import Substitution

Costa Rica's imports of agricultural commodities have increased rapidly in recent years, going from \$1.4 million in 1963 to \$14.7 million in 1968. The accompanying Table 2 shows the principal items of agricultural imports for 1967 and 1968. The table indicates possibilities for import substitutions. High priorities that the team accorded corn and beans, potatoes and other vegetables, oil seed crops, and dairy and poultry products are aimed at improving Costa Rica's balance-of-payments position and at the same time improving food supplies for the country. The special situation for corn and beans is discussed under basic grains and pulses; other promising commodities for import substitution and possible export are discussed below.

1. Nut and Oil Crops

In 1967 there were \$300,000 dollars worth of vegetable oils imported to Costa Rica. The recent plantings of oil palm will help to reduce import needs but it may not satisfy all of the different vegetable oils needed.

The research information from the Los Diamantes research station indicates that oil palms are adapted to certain environmental conditions in Costa Rica, but the team preparing this report does not feel that AID should take an active part in providing assistance on this crop.

TABLE 2

COSTA RICA'S PRINCIPAL AGRICULTURAL IMPORTS, 1967-1968

(In thousands of colones)^{1/}

	<u>1967</u>	<u>1968</u>
Grains and cereal preparation	59,539	56,738
Wheat	(23,496)	(33,451)
Corn	(11,940)	(5,385)
Rice	(7,504)	(8,949)
Fruits and vegetables	19,710	32,525
Beans	(10,230)	(21,125)
Dairy products (incl. eggs)	9,848	12,971
Live animals	3,074	6,348
Meat products (fresh and processed)	7,858	4,879
Sugar preparations	5,334	6,314
Gum and candy	(4,700)	(5,624)
Feeds, incl. oilseeds	8,772	12,398
Specialty products	3,636	7,262
Soaps and detergents	3,012	3,623
TOTAL	<u>122,087</u>	<u>145,772</u>

^{1/} At current rates of exchange (Jan 1970) 6.62 colones = \$1.00.

Source: Costa Rica Planning Office.

The nature of the crop is one which requires the involvement of a large company with extensive capital to establish large oil extraction plants and this cannot be undertaken unless there are 5,000 hectares or more in the neighborhood of the plant. The marketing of oil palm is specialized and needs to be undertaken by professionals already in the business. The large companies can pay for the research needed to promote the crop. The only input that the Ministry of Agriculture might consider at the present time would be to obtain seed of high-yielding hybrids in the Ivory Coast. This material has proved to be higher yielding than the Nigerian hybrids under certain environments. It might be desirable to encourage FAO to provide a French oil palm specialist to assist in the program thus making it easier to obtain the best plant material from the Ivory Coast.

At the present time the Inter-American Development Bank is not making loans for oil palm production and it would appear that this is a wise decision when priorities are considered for limited finances. If the large companies are interested in expansion of the oil palm area, they will find means of assisting the farmer, and if farmers need credit, they can justify it on an intercropping system until the oil palm trees are in production. The world market for oil palm should be studied very carefully before extensive plantings are encouraged.

It would be desirable for AID to support a project on oil crops such as peanuts, soybeans, sesame, safflower, sunflower and coconuts. During the past year Costa Rica had an order from Czechoslovakia for 100 tons of roasted peanuts for the fresh market. It would be desirable to concentrate the research program on the fresh market for peanuts and later move over to the oil market after the fresh market has been satisfied.

Research work is needed to determine the best areas to produce the crops. A plant ecologist has been suggested in the list of scientists under the section on technical assistance. It is important that an economic plant ecologist be selected for the position instead of one interested primarily in the botanical aspects of plant ecology.

Information is needed on all the crops which include the amount of fertilizer and time of application, disease and insect problems, weed control, plant population studies and "rotation and double cropping" experiments. The facilities at the animal nutrition laboratory at the University will be needed to check protein and oil content of the different crops at different stages of maturity for harvest.

Variety trials on soybeans conducted by the University of Costa Rica staff indicated yields of 2.09 tons per acre for the variety Otootan. It would be desirable to include varieties from Taiwan and the Philippines in future trials. Good varieties of sunflower can be obtained from Chile.

Macadamia nuts have a good potential market in the United States where they retail for \$1.59 for five ounces. They are grown commer-

cially only in Australia and Hawaii with a few trial plantings in southern California. The oil content of the nut is 73 percent and the kernels are a good source of calcium, phosphorus, iron and vitamin B₁. The kernel contains 9 percent each of protein and carbohydrates. The tree is very specific in its ecological requirements so it would be desirable to try test plantings at different elevations within the country. The trees at Turrialba seem to be growing fairly well. It might be an excellent crop for diversification in coffee areas since the crop value would be higher than coffee after it is in production. Varieties which should be tried are Ikaiki, Kakea, Keahou and Wailua. Budwood can be obtained from Hawaii.

Coconut research in the early stages should be limited to developing different drying techniques to reduce the amount of spoilage in the copra from fungus and bacteria.

2. Vegetable Crops

An analysis has been made of the market situation in vegetables in the United States between November and April.^{3/} This information should provide a key to what crops could be exported during the winter months. At the present time vegetables which require a great deal of hand labor should be considered, as this type of labor is expensive in the United States and the large processing companies are looking for alternative producing areas where hand labor is available and the political environment is encouraging. Machines have been developed in the United States to plant and harvest some of the important vegetable crops, but in some cases this has tended to lower the quality of the vegetables.

Vegetable crops which would appear promising in the near future are cantaloupes, honeydew melons, tomatoes, cucumbers, peppers, eggplant, okra and green and yellow squash. Cucumbers and pickles may also have possibilities. It might be possible to put small cucumbers in trucks containing brine in order to start the pickling process on a haul to U.S. markets.^{4/}

Research work is needed on ecological sites for vegetable production and food processing. On the management level, information is

^{3/} "Supplying U.S. Markets with Fresh Winter Produce," U.S. Department of Agriculture. Agr. Econ. Report #154, March 1969. A study of production and prices for U.S. and Mexican grown varieties with implications for Central American producers.

^{4/} The competition from Mexico, already established in U.S. markets, should be taken into account. Until Costa Rica can maintain high quality standards in its produce, increased production should be seen as import substitution rather than export.

needed on insect disease and weed control. Research work is also needed on irrigation, plant spacing and fertilizer studies as well as variety trials.

3. Fruits

Many fruits are being produced in Costa Rica at the present time as well as a few nut trees. Strawberries produce well in Costa Rica. This should be an excellent crop for export if a quantity of highly graded fruit can be maintained for market during the winter months in the United States and Europe.

Dr. Russell Desrosiers wrote a paper titled "Possible Crops for Diversification in Costa Rica" and there is no point in discussing these crops in this paper but attention should be focused on the crops he mentioned. It might be desirable to consider avocados, platanos, mangos, and papaya as priority crops for additional research. Bananas, papaya and citrus are not included although they are very important. It is the opinion of the writers that large plantation crops can be handled by private enterprise since it has funds for research activities. Citrus should receive some attention from the standpoint of the home gardener. Chiriqui Citricos in Panama has done a great deal of research on oranges and lemons and it would be desirable for local research staff members to visit their operations which is located near David to obtain some first-hand information.

Minor crops which should be considered in the future for introduction and research are as follows:

Custard Apple - Annona reticulata
Ilama - Annona diversifolia
Chirimoya - Annona cherimola
Passion Fruit - Passiflora edulis
Soursop - Annona muricata
Sweetsop - Annona squamosa
Guava - Psidium quajava

The market for tropical fruit is somewhat limited in the United States, but is increasing every year due to the increasing number of foreign students attending U.S. universities and the influx of Puerto Ricans and Cubans. There is an excellent market for tropical fruit cocktails such as Hawaiian punch. A considerable amount of work has been done in food technology at the University of Puerto Rico with tropical crops. It would be highly desirable to send the professors in charge of food technology at the University of Costa Rica to Puerto Rico to review the research work that has been accomplished over the past ten years. They would return with some new ideas on processing tropical crops which should be tried locally. Several processing plants are now in operation in Costa Rica and incentives are needed to encourage more processing plants.

Research work is needed on testing local and introduced varieties. Selections of avocados should be made to try and find trees resistant to root rot caused by Phytophthora cinnamon. The best place to look for resistant material is in low land areas which are poorly drained. If resistant trees could be located, the trees could be budded and distributed to other countries where this is a problem. At the present time avocados are being produced for export and all indications are that this is a profitable business venture.

Excellent mango varieties are now available in Costa Rica such as Haden and Julie. These varieties should be increased so that variety trials can be established. Canning trials of high quality fruits should be undertaken and processing of chutney may be worth trying. In order to extend the harvest season, it would be desirable to try Heitt, Kent, Carrie, Edward, Earlygold, Fascell, Palmer and Fairchild in replicated trials.

Research information is needed on all of the major and minor fruit crops. Fertilizer trials are needed to determine the most economical fertilizers to use and the proper time for the application. Foliar analysis should be made at the University laboratory to determine correlation studies for fertilizer recommendations in the future.

The two new crops mentioned by Dr. Desrosiers which should be considered priority crops for future research are macadamia nuts, Macadamia Terrifolia, and Naranjilla, Solanum quitoense.

Naranjilla also requires specific environmental conditions. It grows at higher elevations in Ecuador and Panama. It makes an excellent fruit juice and is also used for ice cream, sherbets, jellies and jams and the concentrated juice can be frozen. Several U.S. companies have expressed an interest in the fruit but to date they have not been able to obtain the fruit in sufficient quantity to warrant a marketing research program. This crop should be tried at elevations of 3,000 feet or higher, as the plants prefer temperatures below 85°F. The only problem in growing the crop is fusarium wilt which can be avoided by planting in areas with good water drainage.

4. Specialty Crops

Dr. Russell Desrosiers mentioned several spices as possible crops for diversification. These crops should be considered as low priority until the market situation is reviewed very carefully. Spices are now grown in other parts of the world where labor costs are very low. It would be important to determine the cost of production on several of these crops.

It would be desirable to establish an introduction garden for the spices so that plant material will be available if the market studies prove their economic feasibility. Spice production may be increased

rapidly in the Western Hemisphere if Far East sources become unavailable. A few countries are now producing spices, such as Guatemala and a few of the islands in the West Indies which should be visited by the local research staff.

Members of the team spoke with people in Costa Rica who have been promoting specialty crops and who are themselves engaged in the production and marketing of flowers,^{5/} mushrooms and processed specialty foods. These are high-value crops making intensive use of land and labor and hence the kind that should be encouraged in Costa Rica. Flowers, for example, may use 100 workers on a 10-acre covered growing area.

In each case, the specialty crops promoters have seen a market and have sought the production of crops to fill it. There has been a knowledge of the marketing system involved, of price and volume potentials, cost comparisons with other producing areas of the world and, in some instances, agreements to purchase the output of Costa Rican cultivators. The size of markets and the number of producers involved have not been large. But for export purposes, a number of specialty crops, each with sales of one or two million dollars, would, in the aggregate, make a substantial contribution to Costa Rica's balance-of-payments position.

The team notes that promoters of these crops are usually adequately financed, involve U.S. investors, managers or market organizations. The Export Promotion Center and the Costa Rican Corporation for Industrial Finance (COFISA) are both involved in assisting such efforts. Accordingly, the team feels that AID support should continue to be channeled through these agencies rather than indirect assistance to anyone in several of the specialty crops.

A resident marketing specialist, knowledgeable about U.S. tariff provisions and marketing systems, could be helpful to the local investment and promotion agencies and might be of some assistance to individual firms planning the export of some new specialty food product.

^{5/} Louis Berninger of Wisconsin University discusses the prospects of growing flowers in Costa Rica in a report made July 1, 1969. The report to the AID Mission deals with promotion rather than economic or organizational aspects of a floriculture industry in Costa Rica.

IV. Priorities in Agriculture for Food Crops and Rural Income

A. The Basic Grains and Pulses

1. Background and Current Supply Situation

Traditionally, the diets of the great majority in Costa Rica have been composed of corn and beans. For many years these two were the subsistence crops of the small farmers; they ate what they produced and had little left over for marketing. Thus, the standard of living of many in Costa Rica was closely tied to fluctuations in the amount produced and in the prices received and paid for these crops during the year.

The situation has changed significantly in recent years in several respects. Subsistence farmers are now a smaller portion of the population than 5-10 years ago; many have gone to work in banana and coffee plantations where wages have risen; others have migrated to San Jose where jobs have increased and living conditions improved; still others have gone into production of other crops which offer a better return. Peoples' diets have also been changing with increasing incomes and urbanization. There is more variety in peoples' diets. Rice makes up a larger proportion of the grains consumed while the amount of corn has fallen; more bread is eaten; a large proportion of the corn crop is going into feed for livestock and poultry; and in recent years Costa Ricans have been eating more poultry (though not more beef on a per capita income basis). Land has also been moved out of corn and beans and into other commodities, particularly the traditional export crops, as markets for them have improved.

Because the Nation's attention is on export crops and because corn and bean production remains in the hands of small farmers following traditional technology, productivity is low (about 80 percent of farms producing corn and 77 percent of those producing beans are less than 100 manzanas).^{6/} Productivity in Costa Rica is lower for these two crops than in other Central American countries; for corn, average yield per hectare was 1.4 metric tons (1968) and for beans, yields averaged only 0.4 metric tons.

Corn: Corn production has also suffered from the competition of other crops, such as bananas in the Atlantic Coast area. In 1967, the Ministry of Agriculture carried out a campaign for improvement of technology with mixed results. Unless substantial new efforts are made, corn production will not increase significantly in the next few years. The minimum prices set for corn in the Central American countries operate in a narrow range, but sometimes the purchasing agencies in other CACM countries lack funds with which to apply minimum price policies and corn may enter Costa Rica through private channels at somewhat lower prices.

6/ 1 manzana = 1 acre.

Rice: Rice production has been increasing because of the development of farming operations in the South Pacific region of the country which has good natural conditions for the production of upland rice. Selected higher-yield varieties have been introduced and improved production technology is followed by larger operators. Higher prices set by the National Production Council (CNP) a few years ago provided increased incentive. But CNP reduced the minimum prices for rice on the 1969/1970 crop in order to bring them closer to the prices that prevail in other CACM countries. It is estimated that during the next few years the country's production will be sufficient for meeting consumer demand.

Beans: There has been a marked downward trend in the production of beans despite the fact that the prices established by the CNP have been higher than those of the other Central American countries. Although the CNP has lowered prices for 1969/1970, they are still higher than those that prevail in the other countries of the region. Unless substantial new efforts are made, bean production will continue to decline during the next few years while imports continue to climb.

2. Proposed AID-Support Strategy

a. The General Strategy

The team believes that AID-GOCR strategy for basic grains and pulses should be directed at increasing productivity by improving production technology. High support prices encourage the use of high-yield technology, if it is available, but they do not generate the improved technology. Hence, high support prices for a commodity may increase production by diverting land from other commodities, but they do not necessarily contribute to higher productivity (yields per acre). The team does not believe that Costa Rica should seek self-sufficiency in corn or beans at this time. Comparative costs and alternative opportunities seem to argue that, until high-yield technology can be more widely applied, Costa Rica continue to import a portion of its needs in corn and beans from other CACM producers.

Nevertheless, within the basic grain and pulse category, U.S. AID strategy should place highest priority on increasing productivity and production of both corn and beans. In 1968 imports of these two crops were almost \$4 million--with beans accounting for \$3.2 million. (See table 2, p. 13). The situation for these two commodities was not altered in 1969. Moreover, since corn serves as both food and feed, increased production could reduce the necessity for importing feeds and hence save part of the amount spent on feed imports, over \$1.9 million dollars in 1968.

Besides being important elements in Costa Rica's precarious balance-of-payments position, corn and beans are the crops most widely grown in the country and the mainstay of the diet for most Costa

Ricans. Hence, improvements in productivity and production of these two crops could contribute directly to the attainment of the other two agricultural sector objectives; namely, to increase rural income and provide more food for all. The case of beans is doubly important in local diets because they are an important source of proteins for most low income people in rural and urban areas.

The lag in production and productivity for both crops is attributed to several factors: (1) These crops are grown largely by small farmers. (2) These farmers receive scant assistance from any source to improve their farming practices, to introduce new higher yielding varieties and the credit to buy needed inputs such as fertilizers, pesticides, etc. ~~It is estimated that less than 2 percent of the agricultural credit available in Costa Rica goes to corn and beans.~~ (3) While production of corn and beans is covered by support prices set by the CNP, many of these farmers operate on a subsistence basis, producing little for market and hence are little motivated by the CNP prices. Moreover the precarious financial position of most small producers means that they are likely to sell their product immediately after harvest to a transporter or other middle man, receiving somewhat less for their product than by taking it to an agency of the CNP.

While the technology for producing corn and beans has progressed little on the small farms, some research has been done and is going on at Turrialba, the OAS experiment station located in Costa Rica, and at the Fabio Baudrit experiment station associated with the Ministry of Agriculture and the University of Costa Rica. Yields from experimental trials for corn run over 100 bushels per acre compared to a domestic average of less than 20 bushels per acre (U.S. average is 78); for beans, experimental yields are recorded at almost 3,000 lbs. per acre compared to farm averages in the country of 320 lbs. per acre (U.S. average is 1,219). (See table 4, page 29) There is considerable variability among trials; much more adaptive research is needed. But the evidence suggests that a technology is available to permit very substantial yield increase if utilized in place of current practices. (Hopefully, technology will continue to improve, hence, the issue of waiting until there is the improved technology cannot be justified in the face of urgent current needs.)

Grain strategy: For corn, sorghum and rice, AID should direct efforts to improve production technology and to seek ways of assuring more widespread adoption. AID should encourage price support levels for these grains which will continue to exert a positive influence toward increased productivity on current acreage. Recent price reductions on rice were appropriately taken as the country is now verging on supplies in excess of domestic demand. Price support levels in Costa Rica are above world market prices and above levels at which the commodities might be purchased from other CACM countries. Efforts should be encouraged to bring them more nearly in line with production costs and market prices of these other countries.

Pulse strategy: Pulses are an important source of protein for a large number of low income people in both rural and urban areas. Hence AID should support efforts to increase the productivity of present bean farming. Experimental trials indicate possibilities for greatly increased yields, even with present varieties when improved practices are followed. In addition to research activities on the red and black beans which are staples in the Costa Rican diet, new efforts should be made to introduce cowpeas into general production. This pulse may be grown as widely as beans (and does better in low-lands), offers similar protein quality, and produces as much per hectare. Moreover, edible cowpea seeds have been recommended as a potential export crop to the United States and other countries. Soybeans have been tried; the reports to date are not encouraging, but experiments were limited to strains used in the United States. A program of research seeking possible new strains suitable to Costa Rica should be supported. Efficiently produced, soybeans could not only fill a need for more protein in human diets, but also help satisfy needs for a growing livestock industry.

b. The Corn and Bean Program

The problem of improving yields and production in corn and beans is to develop a delivery system which will enable the small farmers to adopt what new technology is available. The new technology consists of better seeds; the right kinds and amounts of fertilizer applied in approved manner; and the application of the right kind and amount of pesticides, weed deterrents, etc. When and as needed, part of the new technology is also a double-cropping or a successive cropping of corn and beans and, in some areas, cowpeas or sorghum. In many areas where corn may be grown, local varieties of beans or cowpeas may be planted between the rows of corn to permit a harvesting of both crops in seasonal cycles.

Given the limited experience of small farmers and their well-founded concern to avoid losses in their subsistence crops, the new technology needs to be delivered in a package which virtually eliminates risk - whether occasioned by shortcomings on the part of planters, unseasonal weather, or the uncertainties of the market. Accordingly, the team proposes that AID give high priority to a well-publicized, broadly-supported campaign concerned with raising yields of corn and beans and of increasing overall production. The campaign should be planned for at least 3 years. The first year would be set to determine feasibility and develop a system which will deliver the packaged technology to the producer and facilitate adoption. The package would be physical as well as conceptual. It would contain the best trial seeds, fertilizers, insecticides, etc., available, each in its own colored packet with explicit picture instructions on the order of using each packet and the work to be done to realize optimum yields. These instructions would also include the pattern of double or successive plantings of the two crops wherever feasible.

The distribution system might well utilize the existing private sector agencies. There are about 125 agro-service agencies throughout the country (about 75 are distributors for Fertica). Each of these agencies is already serving a clientele of largely middle-size farm units (50-200 manzanas) and these would be the most likely prospects for a program to increase productivity. They would also be the best prospects to serve as demonstrators of an improved technology.

Specifically, the fertilizer and supply companies operating in Costa Rica would be given responsibility for putting together a physical package for cultivating 10 manzanas (more or less) in corn and in beans using agreed-upon seeds and appropriate kinds and amounts of fertilizers, pesticides, etc. Explicit, illustrated instructions would go with each package. Seeds would be tested and certified as to germination.

The local bank offices would handle the credit. The National Bank of Costa Rica has 123 offices throughout the country and its Rural Credit Department is specifically geared to handle credit needs of small and medium-sized farms. All together there are 159 bank offices in 82 population centers of the country. The likelihood is high that both a bank office and a supply agency will be found in many of the villages and that managers in both could agree on 5-10 farmers in their area who would be good prospects for the program in its first year.

Assuming an outreach of 500 cultivators, each one planting 10 manzanas to improved seed varieties and employing better practices, there would be about 8500 acres of higher producing corn. Average yields are now about 1000 lbs. per acre (against 6,000 in Costa Rica test trials). We might assume production of 2500 lbs. per acre on the demonstration farms (or perhaps 1000 lbs. over their usual levels). This would result in some 8,500,000 additional pounds of corn in the first year. At c23.00 per quintal,^{7/} this would represent c195 million colones of additional gross income to the 500 cultivators. The program would be designed to double-crop with beans wherever feasible (or cowpeas or sorghum); hence both increased production and increased income would be significant.

The second year program would build on the demonstrated value of the first. The package program and the credit for it might be made available to all farmers within reach of the agro-service stations and the bank office which chose to participate. The distribution system would remain in regular commercial channels and hence add little burden to government agencies after the first 2-3 years of program organization and promotion.

Participating farmers would want and might be given assurances of two kinds: (1) their product would be purchased by the CNP at regularly established prices; (2) if the crop were lost, owing to conditions beyond the cultivator's control, the cost of the packaged inputs would

7/ 1 quintal = 100 lbs.

be prorated over a three-year period rather than having to be repaid after the crop year.

c. The Storage Program

There is virtually no warehouse storage in Costa Rica suitable for long time storage other than that controlled by CNP. CNP storage at present is:

Silo type	(bulk)	320,000 cwt.
Warehouse	(sack)	327,000 cwt.

Warehouse storage appears to be adequate for present needs, but as population increases and production increases, more storage will be needed. This will be particularly evident if the corn and bean production program is carried out effectively.

Added warehouse and drying facilities in the southern rice producing area are needed; this need is estimated at 2 warehouses each with 2500 cwt. capacity and with adequate drying facilities.

A warehousing law should be written covering warehousing standards. The law should cover warehousing of beans, rice, corn, grain sorghums, and probably should cover other crops. The warehousing law should permit and facilitate operation of warehouses by cooperatives and other private groups. Provisions of the law should apply equally to CNP and private organizations.

There is need for a grain standards law also. The law should require establishment of grain testing laboratories and these should be under supervision of the Agriculture Ministry. Grain testing laboratories should be operated by private operators if available; alternatively, they might be operated by the University of Costa Rica. Farmers and others could utilize laboratories for grade determinations. Small fees might be charged for laboratory services.

d. The Seed Program

A seed law should be enacted covering seed standards and providing for seed testing laboratories. Supervision of laboratories should be under the Ministry of Agriculture and facilities operated by private operators, if available, or by the University of Costa Rica.

Many farmers are not using desirable varieties. Much seed is home grown. Other available seed is neither tested nor treated and is of low germination, which contributes to dissatisfaction among producers and deters use of improved technology generally.

3. The CNP and Policies on Grains and Pulses

The CNP has had a major influence on developments in the basic grains and pulses for the past 15 years; the proposed support strategy for AID cannot be carried out without taking CNP into account. Nevertheless, the limited scope of this paper precludes a general analysis of CNP functions or recommendations on organizational or operational changes. Presumably, such recommendations will be made by others who are now making related studies as part of the agricultural sector analysis and loan proposal.

So far as the AID strategy on corn and beans is concerned, the special program outlined might best be carried out with CNP and the Ministry of Agriculture participating with other public and private organizations in the concerted effort suggested. The CNP would need to assure its support prices for any increased production and facilitate handling by its regional agents of crops brought in by participating farmers.

Regarding AID support for a warehouse law and related provisions and on seed development and certifications, these are programs in which CNP has had responsibility. But given its many other responsibilities, the CNP appears to have done relatively little in these areas. Hence, the changes suggested in this paper could and should be considered as part of a more general review of functions carried out by CNP and other GOCR agencies affecting agricultural development.^{8/}

^{8/} A part of the CNP review and further recommendations are contained in the subject paper appended to this report.

B. Other Food Crops (Potatoes, Vegetables and Fruits)

1. Background and Current Supply Situation

Unlike export crops and the basic grains, there are virtually no data on production and consumption of the many fruits and vegetables grown in Costa Rica. There is considerably more elasticity of demand for these kinds of food than for corn, beans and rice. People will buy more fresh produce if the prices are lower relative to their incomes. At the same time most of these crops are perishable and hence are marketed soon after they are harvested. Accordingly, production and consumption are adjusted, with price as an arbiter and there is little physical evidence of either surplus or shortage.

Trade statistics indicate that production of fruits and vegetables are often not adequate to demand in Costa Rica. Imports were high for a number of fruits and vegetables in 1967. Some 9.5 million colones were spent for fresh and processed food in these categories (besides beans) and in 1968 the figure rose to 11.4 million colones (see Table 2). Garlic and onions were imported in significant amounts. Processed tomatoe products were imported from Portugal to meet the needs in Puntarenas associated with the fishing industry developing there. Processed fruits, marmalades and preserves also accounted for a considerable portion of Costa Rica's food imports.

A rapidly growing population and national emphasis on traditional export commodities have made it difficult for Costa Rica to maintain per capita levels of food production and consumption. During most of the 60's, Costa Rican agriculture failed to maintain food supplies to levels of 1957-59. Using the period 1957-59 as 100, overall agricultural production in 1968 was 94; crop production, 101; food production, 88; and livestock, 77. Production rose in 1967 and 1968, and in 1969 production of rice and livestock (beef) were available for export. A serious effort to increase corn production was made in 1967 through a "National Corn Plan." While some productivity gains were recorded, imports remain necessary. Production and productivity in beans, the Nation's number two food crop, remain low and requirements run 30-40 percent above domestic supplies. Corn, beans and other vegetables are primarily grown by small farmers. Support prices for corn and beans fail to raise production because the yield-increasing technology on food crops has lagged and small farmers have little credit or other assistance available to them for improving practices.

Retail prices for fresh fruits and vegetables do not seem out of line with prices of grains, meats or dairy products. Supermarkets as well as small food stores carry a variety of fresh produce throughout the year. However, the quality of fruits and vegetables as they come to market and as sold in retail stores is low. Every display of produce the writer inspected in retail stores or market stalls showed signs of poor handling and inattention to quality.

2. Proposed AID-Support Strategy

It is on food crops grown by the smaller farmers that AID should direct its principal support effort. These are the most populace groups of farmers and those who have been largely bypassed in the developing Costa Rican economy. These producers, estimated at more than 50 percent of all Costa Ricans engaged in farming, have received scant assistance from any source and operate at levels little better than subsistence. They use virtually no manufactured inputs such as fertilizers or insecticides to better their yields. Often they farm only a portion of the land they have and produce for subsistence needs alone. These farmers are located principally in the Meseta Central, but increasing numbers are moving out to the frontier areas of Costa Rica -- with or without benefit of the agrarian reform and colonization agency, ITCO.

A principal thrust of AID's support effort should be to intensify production among these farmers, helping them to increase their productivity. By increasing their productivity they will have more to market, thereby increasing earnings and providing more food for the urban population. Hence AID's support to them will directly help Costa Rican agriculture make two major contributions to the nation's economy: more income and better income distribution among rural people, and more food for all the people.

AID's support efforts should be along three principal lines: (1) research to assure a continuing flow of new production and marketing technology on which increased productivity and better quality produce is based; (2) marketing services and facilities which will permit farmers and consumers to benefit from increased product; and (3) credit and cooperative institutions which will facilitate adoption of the improved technology and assure the small farmer more muscle in the market place.

The argument is often made that assistance should go to large farmers because production gains from each dollar expended for them will be greater than a like sum spent to help small producers. The issue here, however, is where AID should put its support after taking into account what other resources are available in the country. The evidence is that larger commercial farmers are already receiving assistance from agencies of the GOCR and the international banks. Availability of credit by size of loan is indicated in Table 3, page 28. Operationally, assistance in credit, research and extension does not get out to the very small farm in any event, and particularly not to those who have been moving out to Costa Rica's frontier areas. Moreover, production gains are not the sole objective of AID assistance; agricultural development is more than increased production. AID support regarding food crops should be principally directed to smaller farmers who are able to use it and who will profit from it. Returns from such investment would be anticipated in production gains and in a broadening of the socio-economic base of the GOCR as well.

TABLE 3

DISTRIBUTION OF AGRICULTURAL CREDIT BY SIZE OF LOAN^{1/}

<u>Amount of Advance (Colones)</u>	<u>Number of Advances</u>	<u>Total Amount Advances (in thousands of colones)</u>
<u>COMMERCIAL DEPARTMENT</u>		
1,000 or less	0	0
1,001 - 2,000	1	2
2,001 - 5,000	11	42
5,001 - 20,000	61	842
20,001 - 100,000	268	14,024
Over 100,000	<u>250</u>	<u>136,055</u>
Total	591	150,965
<u>RURAL CREDIT DEPARTMENT</u>		
100 - 500	1,460	586
501, - 1,000	2,928	2,517
1,001 - 2,500	3,517	6,273
2,501 - 5,000	1,944	7,397
5,001 - 7,500	571	3,601
7,501 - 10,000	553	5,078
10,001 - 15,000	488	6,644
15,001 - 20,000	132	2,452
20,001 - 25,000	73	1,727
25,001 - 30,000	47	1,345
30,001 - 40,000	40	1,443
40,001 - 50,000	37	1,793
50,001 - 75,000	<u>1</u>	<u>72</u>
Total	11,791	40,927

^{1/} Distribution of Agricultural and Livestock Loan Advances During 1966 by the Commercial Department and Rural Credit Department of the National Bank of Costa Rica.

Source: Banco Nacional de Costa Rica, 1966 Memoria Annual.

3. Improving the Production of Potatoes, Fruits and Vegetables

Efforts to improve production of these food crops may take three principal directions: (1) research to develop better seed stock and appropriate cultivation practices; (2) helping the farmers to obtain improved technology as it becomes available; and (3) having the marketing system recognize and reward better quality products.

AID support may most effectively be given to strengthen research resources and capability so that more nearly adequate technology may be generated. In addition to the national research efforts, AID should consider ways in which better communication may be obtained between the national and international research efforts and both more fully utilized. As the following table indicates, yields of many vegetable crops as well as corn and beans may be increased several-fold if farmers would adopt technology developed in the nation's research stations.

Needed work to make the market system more responsive to produce quality is outlined on the following pages.

TABLE 4

YIELDS OF SELECTED FOOD CROPS
(Pounds per acre)

	COSTA RICA	U.S.		COSTA RICA	
	Yields From Experimental Trials	Average Yields	Average Yields	Cost of Production ¢ per Manzana	Price per Quintal
Corn	6,160	1,008	4,368	¢ 437.00	¢ 23.00
Beans	2,985	640	1,219	¢ 600.00	¢ 58.00
Soybeans	1,980	N.A.	1,596	N.A.	N.A.
Onions	42,800	11,764	18,000	¢ 5,360.00	¢ 50.00
Cabbage	51,000	17,671	16,000	¢ 1,339.00	¢ 25.00
Tomatoes	23,520	16,472	20,000	¢ 7,119.00	¢ 30.00
Cucumbers	9,852	N.A.	7,440	¢ 2,142.40	¢ 20.00

Source: Based on data supplied by researchers at the experiment station in Turrialba (IICA).

4. Improving the Marketing of Potatoes, Fruits and Vegetables

There is a widespread agreement that most Costa Rican farmers do not take much effort to improve the productivity of their operation nor the quality of their product. A major reason for this is the absence of market incentives. Many small farmers have found that if they (and their neighbors) have a good year in a particular crop, prices are depressed and there is no gain for their increased product. Many have also found that the market for their products is not discriminating on quality differences. Usually they receive no better price for products of better quality. Hence, improvements in productivity and quality depend on improving the marketing process for these farmers and their products.

Among key factors in market improvements for potatoes, fruits and vegetables are: (a) a system of grades and standards covering both the products and their packing; (b) a system of crop estimates and of market news to guide farmers in planting and in bringing their products to market; (c) a wholesale produce market in San Jose with ample cold storage facilities; (d) a channeling of more credit to farmer cooperatives and other small marketing groups to facilitate and improve their marketing operations; and (e) further support for research on handling and processing fruits and vegetables.

a. Grades and Standards

If Costa Rica has aspirations for improving the quality of products moving in domestic markets or to export more of these products to other countries, it will need to establish a viable system of grades and standards. The Ministry of Agriculture and private business firms recognize the need for doing so but thus far adequate resources have not been made available for this purpose. AID support should take the following forms: (1) providing that a resident technician in marketing include among his functions assistance to the Ministry of Agriculture and private groups in establishing grades and standards for selected fruits and vegetables; (2) defraying costs of training for personnel to staff a grades and standards unit within the Ministry; and (3) defraying costs of material to be used by the unit in programs of education and information for producers and consumers.

b. Crop Estimates and Market News

In order to bring about a better balance between supply and demand of principal fruits and vegetables, producers, consumers and distributors need to have information on what is moving in the domestic market and likely levels of seasonal supply. The Ministry of Agriculture and private firms recognize the need but no system has been established for gathering needed information or disseminating it. AID support should take the following forms: (1) providing that a resident technician in marketing include among his functions assistance to the

Ministry of Agriculture and private groups in establishing a system of crop estimates and market news; (2) providing for TDY technicians to help organize each of these functions, when all groups concerned seem ready to "go;" (3) helping in the training for personnel to staff the units for making crop estimates and for providing market news; (4) defraying cost of equipment needed to collect, collate and disseminate the information gathered.

c. Wholesale Market and Cold Storage Facilities

Several proposals for a wholesale produce market in San Jose have been drawn up during the past 5 years testifying to a need recognized by different groups concerned with improving this part of the market system. The need arises from the growing population of San Jose and the inability of the central "retail" market to function effectively in this area. Another reason for establishing a wholesale produce market is related to the near monopoly now held by a few produce buyers, with attendant arbitrary and widely fluctuating pricing. If the wholesale market includes cold storage facilities, then farmers and major retail buyers may have alternatives for buying and selling and hence reduce arbitrary price setting. AID support should take the following forms: (1) a resident marketing advisor should include among his functions working with local government authorities, private firms such as supermarkets and the retail cooperatives to secure widespread support for a wholesale market and cold storage facility; (2) AID should offer to meet one third of the cost of building the market, the other two thirds to be met by local public authorities and private retail organizations. (The writers were assured by representatives of these local groups that their share of the financing would be forthcoming); and (3) provisions should be made for a TDY specialist to help in drawing up final plans for the facility and assuring its technical efficiency.

d. Credit to Marketing Organizations

Most marketers, like most farmers in Costa Rica, are small operators with inadequate capital and sources of credit. More credit should be made available for marketing cooperatives---producer, consumer and distributor---and for others who operate as voluntary associates rather than as formal co-ops. More credit should also be available to small food processors.

Among conclusions made in a recent report on cooperatives in Costa Rica is that a number of cooperatives, particularly in coffee and in ~~dairy~~, have proved effective instruments of the producers in their marketing efforts. There have been other instances in which poor management and the unwillingness of small producers to remain in the fold when higher prices are available elsewhere caused cooperatives to fail. We concur in the recommendation made in the cooperative study that a wholesale produce market should be organized for San Jose.

However, we feel that ownership should include retailer organizations as well as producer groups. Having discussed the subject with several interested elements, we feel that the interests of producer, consumer and distributor would be better served if control were not limited to producers alone. We are uncertain about a second recommendation made in the cooperatives study, namely, the creation of a commodity marketing cooperative, but would not accord it as high a priority for AID support as other aspects of marketing discussed in this section.

e. Support for Research on Handling and Processing Food Crops

There is virtually no research being carried on in Costa Rica on handling and transport methods for fruits and vegetables or on food processing. The result has been large losses in perishable commodities and slow progress toward processing a portion of the fruit and vegetable crops which are grown. The program of needed research has many facets: (1) studies on ways of handling fresh produce to reduce damage and loss in movement from farm to retail market; (2) studies on packing, containers and packaging materials which facilitate handling and retard loss; (3) studies on methods of food processing such as canning, dehydration and freezing to assure proper taste and qualities; and (4) studies on food technology generally to determine chemical properties, nutritional values and changes under different conditions.

It should be noted that processing a portion of the fruit and vegetable crop prolongs the life and availability of these crops, broadens the market for them and contributes to increased value for them in foreign and domestic markets. A number of organizations in Costa Rica are actively seeking opportunities for processing food crops grown in the country and these should continue to merit AID support.

Three major problems cited by food processors are: (1) the difficulty of securing sufficient supplies of a crop with sustained quality for processing; (2) the absence of research for conducting needed studies on methods of packing and processing; and (3) inadequate information on import provisions of countries which may be good external markets.

AID's support in this area should take the following forms: (1) provide TDY specialists in fruit and vegetable handling methods and in food technology to help establish country research units in these areas; (2) provide a portion of the funding needed to equip the two research units (on produce handling and food processing) and to staff them for a period of at least two years. The remaining funds should be contributed by Costa Rican agribusiness organization and by the institution in which the research units would operate. The most likely place for establishing such research units would be the University of Costa Rica. A concrete proposal was submitted to the writers by members of the University staff and agribusiness people have indicated a willingness to provide their share of needed funds; (3) provide for training the staff to man the research units and in turn for them to conduct classes in the subjects of produce handling and food processing; and (4) provide for publication and dissemination of research reports.

C. Meat and Dairy Products

1. Background and Current Supply Situation

Production of meat and dairy products during the 4-year period 1965-1968 has barely kept pace with population growth and has fallen further behind on the basis of per capita demand. With the years 1957-1959 as 100, livestock production fell to 72 on a per capita basis in 1965 and remained below 80 in 1968.

In the case of beef, production has risen from 57,800 metric tons in 1965 to 68,600 in 1968, but exports have risen more rapidly so that per capita availability for domestic consumption has declined. Beef now rates as Costa Rica's third highest export commodity, realizing about \$12.9 million from its exports in 1969.^{9/} Legislation has been enacted and a program administered by CNP to assure that more of the beef produced in Costa Rica be used to meet local demand. But it has not been operative. When market import quotas were involved late in 1969, thereby halting further export to the United States for the year, Costa Rican cattlemen preferred to store their meat in packing plants until Jan. 1 when 1970 quotas permitted them to resume exports rather than market their beef in Europe or to use more of it for domestic supplies at lower prices.

Productivity of beef herds has increased in recent years as cattlemen introduced better breeds. However, there has been little research on forage crops or on mixed feeds. Much of the country's beef supply still comes from grass-fed cattle which do well in lush rainy periods but are allowed to subsist on inadequate diets during dry months. Cattle are sold by weight at slaughterhouses but usually there are no price differentials for quality.

Pork supplies have even been less adequate in Costa Rica than beef. Production has risen from 8.5 million metric tons in 1965 to only 9.4 in 1968, but there has been virtually no trade in fresh pork. Farm prices of pork, per kilo, have not changed during the 4-year period, but retail prices have advanced about 10 percent. Currently, pork prices at retail move in a price range comparable to the better cuts of beef. Consumer preference is for beef rather than pork, but retailers say they could sell much more pork if it were available and, particularly, if prices were lower.

There is adequate slaughterhouse and packing plant capacity in the country and plants are located to serve the principal producing areas and consumer populations. Of about 870 head (beef) daily capacity for export, 330 is controlled by the Cartago Beef Packing Co., about 200

^{9/}

Trade estimates place exports in 1969 at \$15 million.

by a cooperative of the cattlemen and the remainder is in other private hands.^{10/} While CNP owns the plant at Montecillos, it is operated by the cooperative. Export capacity sets the level for domestic production too since the chilling and freezing capacity needs to be the same in any plant used for exporting beef to the United States. Capacity for domestic supplies of beef is approximately the same as for export and the plants could process, in addition, an equal number of hogs.

Prices to cattlemen for export are keyed to U.S. prices in Chicago and domestic prices follow accordingly. While the Minister of Hacienda has authority under legislation dating from WW II to fix prices per pound of carcass at the slaughterhouse and CNP has power to set prices for the plant at Montecillo (which was to supply domestic needs for the Meseta Central), no effective price controls are now in operation. Retail prices for different meat cuts are followed by most retailers. Better cuts of beef tend to be underpriced relative to those of poorer quality. A price is set for the very lowest quality and kinds of meat. The retailing of meat in Costa Rica is probably better than in other CA countries and indeed in most of South America. Supermarkets have prepacked meat; small butcher shops in the towns are reasonably clean, most have refrigerators and modern cutting equipment. CNP expendios do not carry fresh meat.

Production of milk and dairy products in Costa Rica has kept pace with population growth, but not with demand. In 1965, 144,000 metric tons of milk were produced and in 1968, 164,200 tons. There has been some export of processed dairy products to other CACM countries and some import of powdered milk under PL 480 for school feeding programs.

Productivity of dairy herds has been low; average production per cow is 2,280 lbs. of milk per year with better farms averaging 5,200 lbs. (U.S. average is 8,513 lbs.). Labor efficiency is also low by U.S. standards; the man-per-cow ratio is particularly low in larger dairy farms, and labor income is only ¢250 per cow. Medium-sized dairy farms, those of 100-200 cows, are more efficient than larger or smaller operations in both labor use and return on invested capital.^{11/}

The industry is dominated by the producers' cooperative, Dos Pinos, which handles about 60 percent of all milk produced (1969) and a much higher percentage of all milk processed and marketed through commercial channels. Dos Pinos manufactures virtually all the whole dry milk and non-fat dry milk powders produced in Costa Rica; it also produces much of the ice cream and lesser amounts of butter and cheese. Most of the milk moving through commercial channels is now pasteurized and the delivery system to retail outlets seems good.

10/

This capacity is only partially used.

11/

A report on the "Economics of the Dairy Industry in Costa Rica" by Ralph Eastwood in 1968 to the AID Mission.

Prices of fluid milk at retail were controlled but are no longer fixed; still they have changed little in the years from 1965-1968. Farm prices have gone up a little in the same 4-year period. Four grades of fluid milk are produced and sold at retail: (1) the standard pasteurized grade A sold to stores at ¢0.83 per bottle (this is standard U.S. quart and is about 13¢ U.S.) and retailed at ¢.90; (2) a vitamin-added milk which retails at 1.00 colon; (3) a 2 percent butterfat milk at .80; and (4) a skimmed milk at .80 and a skimmed milk at .70. Hence, a wide coverage of the potential market has been obtained.

Nevertheless, many Costa Ricans cannot afford the amount of milk they should probably have in their diets. The GOCR buys about 100,000 lbs. of whole dried milk for distribution to the needy and to institutions (some was also imported under PL 480 until 1969). To increase further commercial consumption, prices would need to be lowered relative to income.

The industry has been growing to meet demand, but better practices to increase productivity have been followed by few dairy farmers. A dairy improvement association has done little and the cooperative says it has looked to the Ministry of Agriculture to provide technical assistance to achieve yield increases. The cooperative spokesman felt that the dairy farmers themselves would be willing to contribute in a coordinated effort if led by the Ministry of Agriculture.

Processing capacity is adequate in the San Jose plant to handle 20 percent more production. Transportation equipment is also adequate, though poor roads were cited as a critical problem. Dos Pinos trucks from the San Jose plant to all parts of Costa Rica except the South Pacific area where there is a small branch plant.

Poultry and egg production has also lagged in the period from 1965-1968. Recent years have witnessed a growing commercial business in poultry, but supplies of feeds have been inadequate and relatively high priced. Supplies have barely kept pace with demand. Egg supplies have been particularly inadequate and imports have risen rapidly in recent years. Costa Rican imports of eggs rose from \$46,000 in 1965 to almost \$725,000 in 1968, virtually all from CACM countries.

Farm prices for eggs have remained constant during the years 1965-68 and retail prices have declined somewhat. Eggs have been available for import at less than farm prices in Costa Rica.

2. Proposed AID-Support Strategy

Per capita protein in the diets of most people in Costa Rica has changed little from levels of 1959-61. Animal protein has remained less than 27 grams per day. Though some improvement is projected in 1970, this presupposes increased production, higher imports or both.

The team recommends that AID give high priority to efforts to increase the production of meat and dairy products including eggs. In order of priority, the following is suggested:

a. Poultry and Eggs

Encourage the production of poultry and eggs. Increases in domestic production of eggs would mean a saving on imports as well as greater likelihood of adequate supplies. Preferences for poultry are as high as for red meat and hence increases in production would supplement supplies of animal protein. The technology of poultry and egg production is such that increases in productivity are possible in a shorter time period and the conversion ratio of feed to meat is better than for large meat animals. Both commercial and family farm production should be encouraged. Commercial production and good productivity is possible on relatively small farms, and hence higher poultry and egg production is likely to mean better rural income distribution. Efforts should include: (1) research to provide knowledge on means for increasing productivity; (2) programs to make the knowledge, the feeds and the other inputs needed more widely available; and (3) credit to permit more producers to utilize higher-productivity technology.

b. Hogs

Encourage the commercial and family-farm production of hogs. Pork production has lagged more than other sources of animal protein in part because there have been fewer resources available for commercial swine production than for beef or dairy cattle. Yet production of hogs in Costa Rica may make efficient use of resources such as cull bananas and hence production costs may be kept down. Commercial production of swine may be efficient on relatively small farms and hence contribute to improved incomes and income distribution in several areas as well as more adequate meat supplies for populations in rural and urban areas.

In his post election speech, Figueres urged increased production of hogs. AID support should be directed at: (1) research to improve knowledge and production, particularly on the use of banana culls; (2) improved extension and other means of getting improved practices more widely adopted; and (3) more credit available for those seeking to improve and increase their commercial swine production.

c. Milk and Other Dairy Products

Encourage increased production of milk and dairy products. These products are excellent sources of protein and consumer preference for them is high. The technology of increasing milk production is largely known and promises more rapid returns than similar efforts on beef cattle. The organization of production and distribution is good so that increased productivity should be reflected in better prices as well as supplies for Costa Ricans. Studies have shown that middle-size farms

are as efficient as larger ones in the returns to labor as well as investment and hence provide more opportunity to smaller farmers than is likely from beef cattle. Efforts should include: (1) research on pasture crops and on feeds, including the use of sugar cane and banana by-products; (2) programs to make knowledge of improved technology more widely available and practiced; and (3) more credit for individual operations and cooperatives to facilitate more intensive production.

d. Beef

Beef production, while important for both export earnings as well as domestic meat supplies, has had adequate resources available to it in recent years. Livestock credit availability from the national banks has risen from \$30.5 million in 1965 to over \$40 million in 1968. In percentages, livestock has gone from 17.3 percent of all bank credits in 1965 to 19.4 in 1968 (Table 5). Virtually all of these credits were made available for beef production. Of all livestock operations, beef cattle involve, on average, the largest farms and utilize the least labor in terms of land or other capital investment. In his post-election speech, Figueres referred to the importance of beef cattle, but observed that expanded acreage to cattle would mean fewer hands needed on the farms. Unless there are changes in U.S. import quotas, the Costa Rican beef cattlemen have already attained production levels adequate to meet this export market. For these several reasons, we consider that AID support for beef cattle may have somewhat lower priority than for the other sources of animal protein identified. AID support should be aimed at providing technical assistance for economic analyses of the beef industry, with particular reference to pricing policies, so that meat might be available to more people in Costa Rica. (A grading system would be needed as a ~~prere-~~quisite to improved pricing policies).

TABLE 5

CREDIT AVAILABILITY FOR AGRICULTURE, STOCKFARMING, FORESTRIES,
GAME AND FISHING, COMMERCIAL BANKS AND
RURAL CREDIT DEPARTMENT

(In thousands of CR¢)

	1967		1968	
Coffee	311,705	percent 48.1	330,668	percent 48.8
Beef Cattle	111,775	17.3	131,593	19.4
Rice	22,303	3.4	33,978	3.5
Cotton	8,635	1.3	14,396	2.1
Sugarcane	13,208	2.0	13,262	2.0
Bananas	18,736	2.9	13,191	1.9
Vegetables	3,330	.5	4,195	.6
Corn	4,705	.7	3,993	.6
Game and fishing	1,029	.2	2,504	.4
Tobacco	1,711	.3	2,067	.3
Cacao	738	.1	1,749	.3
Other	149,551	23.1	136,269	20.1
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total	647,426	100.0	677,865	100.0

Source: Central Bank of Costa Rica.

V. Country Policies and the Challenge of Change

A. Developing GOCR Capability for Agricultural Sector Policies

The task of this team has been made both easier and more difficult by the large amount of written material and the number of reports available to it. What seems lacking heretofore is action. The time seems most auspicious for that now. A new Costa Rican government is taking office with a financial base better than at any time in recent years. A new AID team with a new commitment to agricultural development is working with the people and Government of Costa Rica in a close and creative way.

Proposals along the lines of those outlined under "crop priorities" have been made by numerous analysts in Costa Rica and by others previously brought in by AID and other international organizations. Priorities assigned by this team, like those of previous individuals and teams, are subject to change.

Analysts are not clairvoyant and recommendations inevitably are set in a framework bounded by the current country situation. Current conditions change; only change is continuous. If the recommendations made here and in other papers prepared for the agricultural sector plan are to have value and vitality, they must be seen only as a basis upon which the people of Costa Rica may build in the months and years ahead. The building process is dependent on the capability of the GOCR to provide guidance to the farms and agribusiness firms for making decisions and taking actions in their own and the nation's interest. And a key element in policy guidance is flexibility and timeliness to meet changing situations.

The need to strengthen GOCR agricultural sector policy capability is rooted in the complexities of agricultural development generally: the thousands of individual farms and firms which are involved in agriculture; the absence of coordinated decision making; the uncertainties of weather; the interaction of domestic and foreign market activities. For these and other reasons, there can be little certainty about how much of any crop will be produced, how much will enter commercial markets and what its value will be for the individual farmer or the Nation's exporters. Moreover, changing technology in production and processing may radically alter cost functions and hence market demand. Those who are responsible for GOCR policy therefore need to have an understanding of economic forces and trends and their implications in order to set sound policies. Costa Rica is fortunate in the quality of its technical competencies in this respect, but thus far GOCR officials have had little resources and few instruments with which they could work.

High on the priority list of technical assistance proposed by this team is an advisor on economic policy available to assist the several institutions in Costa Rica which are concerned with formulating agricultural policy. Such an advisor would supplement, not duplicate, indigenous expertise in and out of the GOCR. A U.S. advisor should be particularly concerned with providing a wider range of economic policy alternatives and with developing cost/benefit analyses to assist the GOCR and the private sector in making appropriate policy decisions.

B. Developing a Market-Oriented, Innovative Environment

Traditionally, those concerned with agriculture have been concerned with production problems and processes. This has particularly been the case in programs for agricultural development. The food crisis in 1966-67 gave special credence to the primacy of increasing production.

It is becoming increasingly clear, however, and especially in Latin America, that agricultural problems are rooted as much or more in the market as on the farm. As several GOCR officials said in meetings here, "el mercado es basico." There has been a failure in many quarters to recognize that supplies have almost always kept pace with economic demand and that prices have been the arbitrator. When larger markets have been assured at prices well above production costs, producers have often found ways to boost production and did so. Often, marketing organizations (United Fruit, American Mushroom Co., Mas por Menos Supermercados) have sought out suppliers and helped them produce enough to satisfy their markets. Resources tend to flow toward commodities for which the market is expanding and to move away from commodities when the market contracts.

Producing for market calls for an awareness of the market, its size and preferences, its shifts and proclivities. Part of market awareness is a knowledge of competition and a concern with meeting competitors. This approach, in turn, leads to efforts at improving one's competitive position by improvements in product, production processes or marketing methods. Increasing the size of the market as well as a share of it are part of this process. Production adjustments, up and down, are also means of meeting marketing situations. Competing in the market place puts a premium on innovation.

Technical assistance in marketing is also high on the priority list suggested in this paper. Such assistance and the people who may contribute to it should bring more than technology and techniques. The market is a way of organizing economic activities and a motive force in making economic systems responsive to the people. Hence a market-oriented agriculture can contribute greatly to Costa Rica's overall economic modernization.

VI. Proposals for Technical Assistance

The technicians suggested in this section could be provided by university or private contracts, private foundations, AID personal services contracts or government agencies. The present AID/University of Florida contract could be amended to provide some of the technicians; USDA could provide others. Specialists are suggested for the first 5 years of the program in order of priority under each sub-heading. It is recognized that a small country program will be able to handle few resident technicians and the range of specializations needed might better be met by TDY arrangements. The 16 technicians identified here would probably aggregate 8 man-years of technical assistance per year.

Research, Teaching and Extension

1. Soils Specialist
2. Pulse Breeder
3. Corn, Sorghum, Soybean Breeder
4. Plant Pathologist
5. Forage Specialist
6. Vegetable Crops Specialist
7. Extension Advisor (divided time)

Economics and Marketing

1. Economic Policy and Planning Specialist
2. Marketing Specialist - cooperatives-produce
3. Marketing Specialist - agro-industry
4. Market News Specialist - (regional)
5. Supervised Credit Specialist
6. Farm Management Specialist

Research and Development for Agro-Industry

1. Food Technologist (divided time)
2. Agricultural Bio-Chemist
3. Industrial Engineer

Part of the technicians suggested can be provided from existing AID regional contracts such as Michigan State University on seeds and North Carolina State University on fertility problems, and some of the technicians listed for Costa Rica should be available to assist in other Central American countries and Panama to help solve similar problems. It would be highly desirable to provide grant funds for technicians for salary and logistical support so that they would be available to other countries on a consultant basis.

It is recommended that the foreign staff be provided under a university, USDA, or private industry contract. If a university is considered, other than the one presently operating within Costa Rica, it should be a university which already has experience and a good reputation for such development work. University and USDA arrangements should include provisions for a few resident advisors in the priority areas indicated-- although most of the technical assistance would be by TDY.^{12/} It would be highly desirable to obtain staff members with a knowledge of Spanish.

The contract(s) should be written so that the staff members can provide assistance to all Costa Rican agencies which need the service. The technicians should be located in the agency which has the most highly trained counterparts for his specialty. Arrangements on counterparts and office space should be negotiated before recruitment begins.

A. Research, Teaching, and Extension

A few positions have been indicated as divided time for research, teaching and extension.

A soils scientist should also be able to provide assistance on irrigation practices. He could assist the research personnel in conducting experiments on the use of irrigation water for row-crops in order to determine the most economical amount of water to use for each crop and the frequency of irrigation. He could assist the Government on drainage and irrigation projects throughout the country. By the use of proper drainage and gravity feed irrigation, it should be possible to reduce the disease incidence on vegetables and bean crops by producing them during the dry season. The extension agents will need assistance from the soils scientist on land leveling, irrigating crops and preventing over irrigation which results in the uneconomic use of water and drainage problems at a later date.

The extension advisor should assist the extension division in establishing "aututorial" booths in each of the 11 field extension offices. Two booths in each field station should be sufficient during the early stage of the program. He should work with the research staff in putting together slides on crop production and the narration on magnetic tapes to go with the slides on all the major crops. The reproduction of the tapes and slides should be done in the visual aids laboratory in the Central Extension Office and a series of 12 booths should be available for review by the extension staff and visiting farmers.

^{12/} USDA experience indicates that TDY's are likely to be more effective and make better use of their time if resident personnel from the agency can pin-point problems for their specialized attention and follow-up afterwards.

B. Economics and Marketing

Highest priority is assigned for a resident economic policy advisor who would be able to provide technical assistance to the Agricultural Ministry, the National Planning Office, and private agri-business groups, as well as to the AID Mission. This advisor should have had related experience in U.S. Government dealing with economic policy and planning, with the development of alternative policies and the cost/benefit relationships which might be anticipated.

High priority is also assigned to resident advisors in marketing--one to be concerned with all facets of produce marketing and another with all facets of agro-industry. The first technician would work closely with the Agricultural Ministry and cooperative organizations, private produce handlers and retail groups and the export promotion organizations. He would provide leadership in marketing research designed to improve transportation, handling, packaging and in marketing services such as grades and standards. The agro-industry marketing specialist would work closely with the Costa Rican agencies concerned with diversifying agricultural exports. He would provide guidance on market opportunities and import regulations of countries to which Costa Rican commodities might be exported. He would provide a market orientation for the research and development efforts described below. The marketing advisors would help provide specialized training for Costa Ricans in these fields.

Specialists in farm management and in supervised credit would relate their work to that of the extension advisor. An institutional arrangement would need to be worked out in which the separate but related assistance could be made most effective. The team believes that extension on farm management assistance is not likely to be effective unless coupled with credit and the availability of needed production inputs such as seeds, fertilizers and pesticides. Moreover, projected higher yields would need to be assured of markets without depressing prices if the farmer is to be interested in applying new technology. A marketing specialist with knowledge of cooperatives is therefore recommended as part of this group of advisors.

C. Agro-Industry Research and Development

In the industrialized countries, this type of research is largely done by individual corporations which provide substantial funds for research and development. At present, most of the agri-business companies in Costa Rica are small and do not have sufficient funds for this activity. It is suggested that two long-term staff members and consultants be provided to the University of Costa Rica to assist in the field of research and development on foods. Priority should be given to food technology to develop new tropical fruit cocktails and juices, freezing

and canning of exotic crops, and testing potatoes, platanos and yuca for chips and flour. Research is needed to find by-products for rejects and low-grade bananas and banana and sugar cane plant refuse. Production costs are needed on processing vegetable and fruit crops which require a great deal of hand labor in the States.

Many commercial food processing companies will be looking for foreign countries for producing processing crops which cannot be easily mechanized in the United States. The pineapple industry is moving out of Hawaii gradually due to skyrocketing land prices and the high price of labor. U.S. companies will be looking for countries which have a good soil and climate, political stability and low labor costs. Costa Rica is one of the few countries which can qualify on all counts.

At the present time, about one million dollars worth of starch and starch products are imported to Costa Rica, yet yuca and taro, which are very high in starch, can be grown in most areas. Research is needed to determine how flour, pastes and glues can be made from local crops and how they can be combined with wheat flour to make bread and pastry products. Information is also needed on how by-products of coffee can be utilized since it is fairly high in protein.

D. Training

Participant training should be considered a priority part of the overall program and particularly to develop agro-industry competency. All U.S. technicians should arrange English training on a part-time basis for all of their counterparts and the personnel should be tested in English before they are sent to U.S. universities; technicians who have difficulty with English should be considered for graduate programs in Mexico, Puerto Rico and Turrialba provided they meet the other requirements for graduate training.

During the next five years, it would be desirable to concentrate on training technicians to the Master of Science degree level in the priority subject matter areas. The training will require less time than for a Ph.D. candidate and the trained personnel will probably not be picked up as readily by UN organizations, foreign universities and private enterprise. It will probably be less costly to train two people for an M.S. degree than one for a Ph.D. and the training at this level is sufficient to provide a good teacher with sufficient background for carrying on applied research which should be given priority at this time. At the present stage of development, the quantity of research personnel is as important as quality.

The trainees should do their course work in the United States and arrange to do their research thesis work in Costa Rica.

In addition to research, the foreign research personnel should assist in the teaching program by providing information for teaching or conducting some special classes as fluency in Spanish is attained. The foreign technician should not be hired to replace local personnel except on a very temporary basis but should assist graduate students with their thesis programs. Foreign technicians should provide back-stopping for the extension service.

Appendix I

PEOPLE CONTACTED IN COSTA RICA

GOCR Officials

Alvaro Rojas	MAG - Chief Planning & Coord. Office
Luis Villalobos	Sub-Director Planning & Coord. Office
Juan Manuel Revilla	CNP
Rudy Venegas	CNP - Chief Economic Stud. & Plan Dept.
Jose Manuel Guzman	CNP - Chief Purchases Division Dept. (Ex-Manager of CNP)
Miguel A. Rodriguez	OFIPLAN - Director
Santiago Morera	BCCR
Eduardo Lizano	Academia Nacional de C.A. (ACA)
Mario Cordoba	Economist, Planning Office
Gregorio Alfaro	MAG - Chief Agric. Economist, Pres. Agr. Economists Assoc. of Costa Rica
Lazaro Vargas	Agric. Economist - MAG
Hugo Castro	Agric. Economist - CNP & BCCR

Non GOCR Officials

Victor H. Cespedes	UCR, ACA
Robert Hunter	Director, C.A. Field Program, A.C.M.
Alberto Gonzales	President, Agro Industries, TORO
Jack Harris	COFISA
Robert Vogel	ACM
Enrique Uribe & John Moretti	Mas por Menos Supermercados

Willy Loria	UCR/Experiment Station
Richard Hislop	FERTICA, Asst. Gen'l Mgr. for Central America
Edgar V. Viquez	Pres. Camara Nac. de Comerciantes Detallistas
Charles Vicent Jose Rothschild Humberto E. Abril	Export-Investment Promotion Center
Andres Pozuelo	President, Jack's Foods
Charles Fortier	Director, Cent. Am. Institute of Food Marketing (LANDIVAR)
Rafael Montero	General Manager, Dos Pinos, Dairy Cooperative
Ing. Luis F. Arias	Food Technologist, University of Costa Rica
Dr. Antonio Pichinat	IICA, Bean Breeder
Dr. Jorge Soria	IICA, Cacao Breeder
Dr. Pierre Sylvain	IICA, Plant Physiologist
Watson & Rae	Watson & Rae Co., specialty produce processors
Michael Thomas	Flower producer and exporter
Ing. M.E. Clare	President, Cartago Beef Packing, S.A.
Jose M. Cornelis	UN/FAO Expert on Fertilizers

Appendix II

PRICE STABILIZATION AND STORAGE OF BASIC GRAINS

SUMMARY RECOMMENDATIONS

As used in Costa Rica and in this summary, the term "basic grains" includes: beans, corn, rice and grain sorghum.

1. CNP Authority, Operations and Storage. The law now gives CNP almost unlimited authority in establishing prices, providing storage and processing equipment for handling basic grains. The operating role of CNP should be altered in providing storage and processing of grains to encourage private trade or cooperatives to provide these services.
2. Warehouse Law. The bonded warehouse law promulgated in 1954 should be reviewed to determine if it is adequate to meet current needs of the country.
3. Seed and Grain Standards Law. A seed and grain standards law should be enacted to provide more assurance of better seeds and better quality of grain production, with prices reflecting improved core and quality.
4. More Adequate Credit for Small Producers. Very little credit is available for small producers of the basic grains. More is needed and considerations should be given to a supervised credit program to increase the usefulness of credit extended to small farmers.
5. Support Prices. Farmers are uncertain as to the actual prices they are likely to receive for their grains, despite CNP support prices, because these are discounts for quality and other factors. Local market prices should be established. Premiums for higher quality grain rather than deductions for low quality would be desirable.
6. Credit for Grain, Warehouses, Farm Storage, Dryer and Similar Facilities. Loans of these kinds would help increase production, improve quality, and reduce storage losses.
7. Crop Insurance Program or Credit Loan Relief when Crops are Lost. A crop insurance program is needed, at least by small and medium class farmers, or some form of credit loan program is needed when crops are lost for causes beyond the producer's control.
8. Production and Marketing Information Program. A regular scheduled production and marketing information program should be carried out by extension service and others.

FINDINGS AND SUGGESTIONS

1. CNP Authority, Operations and Storage

CNP is given by law almost unlimited authority in fixing prices for both the producer and consumer on food products, including basic grains. CNP is authorized to provide storage and other facilities and services for food products.

CNP is given too much authority in providing storage and services to permit private trade or cooperatives to get into the business of handling grain.

Law should be amended or policy established to reduce authority to CNP and encourage private trade and cooperatives to provide storage for grains.

A tabulation of all storage for grains is not available.

The Bank has several warehouses for sacked grain. It might be desirable for the Bank to turn this storage to private trade or cooperatives.

There is some storage in retail stores.

CNP now has the following amount of storage located in San Jose and Barranca:

Warehouse (sack)	337,000 cwt.
Silo Type (bulk)	<u>320,000 cwt.</u>
	657,000 cwt.

CNP has submitted estimates of new equipment needed for updating the plants in San Jose and Barranca. A new plant is proposed by CNP in the South Pacific rice area.

It is desirable that CNP plants in San Jose and Barranca be updated. New equipment is needed for unloading, drying, processing, turning, conditioning, moving and otherwise handling grain. Some added storage will be needed to make effective use of new equipment.

For the present, private trade or cooperatives should be encouraged to provide any new plant or plants in the South Pacific rice area.

The trend in the future for storage should be bulk storage, silo type or warehouse flat storage type suitable for handling both bulk and sacked grain.

Bulk storage will reduce costs on unloading, handling, conditioning and load out. Outside truck and wagon unloading bulk grain facilities should be made available. Bulk load out facilities to trucks are also necessary.

To assure handling of grain in South Pacific, CNP should be authorized to provide two 2,500 cwt. capacity drying and temporary storage houses in the South Pacific rice area.

Both houses to be equipped with adequate capacity drying equipment. This will eliminate shipping of high moisture grain to storage and processing plants.

If seed testing and grain laboratories are not provided by private sector or Costa Rica University, the laboratories should be provided and operated by CNP.

CNP personnel should be sent to other countries for training in operations of laboratories and equipment.

2. Warehouse Law

A more satisfactory warehousing law is needed in order to encourage individuals, corporations and cooperatives to establish and operate grain warehouses. A report prepared by James W. Lemley for Grain Storage and Price Stabilization in the Dominican Republic may be used as a guide to determine if the present Bonded Warehouse Law for Costa Rica is satisfactory.

3. Seed and Grain Standards Law

There is a need to enact a grain grading and seed testing law. A handbook, "On Official Grain Standards of the United States," may be used as a guide to drafting an appropriate law for Costa Rica. A seed law should be enacted to assure farmers of supply of certified seeds.

Both grain and seed laws could be expanded to cover other crops. Grain testing and seed laboratories should be provided for. The laboratories should be under the control and supervision of the Ministry of Agriculture.

The laboratories should be operated by private business if possible. As second at least, the seed laboratories should be operated by the University of Costa Rica and third choice, by the CNP.

Seed processing and seed storage facilities are needed. Fees should be charged for both grain and seed testing to help cover the cost of service. Many farmers are now using own produced seed or seed purchased and do not know variety, quality or germination. In many cases seed is not treated. Poor seed results in low production and dissatisfaction among farmers.

Many farmers do not know the quality of their grain production and have to accept grade determinations by buyers.

Farmers could send samples of seed and grain to laboratories for testing. This would assure the farmer of the quality of both seed and grain. Laboratories should be supervised and operated by persons or agencies in which farmers and others would have confidence.

Credit is available to many producers but not all producers are able to get credit or adequate credit. Large farmers who own land and have large operations have less difficulty than other farmers in obtaining credit. Small farmers who are the major corn and bean production source have very little credit available to them. Some of the small farmers who do not get credit could obtain credit but, due to difficulty in obtaining credit, do not try.

A package credit program for small farmers has been proposed. Local banks or other agencies could provide the credit in a form that could be used for equipment, land preparation, seed, fertilizers, weed and insect control during crop growing season and for harvesting and marketing of the crops. Funds authorized could only be used for purpose intended.

Loans for land clearing should be for 5 to 10-year periods. Loans for purchase of machinery should be for a 5-year period.

Relief for non-payment of loans due to crop losses beyond producer's control is covered under Item 7.

5. Support Prices

Each year CNP fixes minimum prices prior to planting basic crops (including beans, corn, rice and grain sorghum). Minimum prices remain in effect for the entire year. The support level is based on estimated supply, production and past prices. Minimum price supports are established for different crops. The CNP operates about 30 buying houses throughout the country to purchase grains and beans. CNP is obligated to purchase any amount of grains offered by producers.

Prior to CACM, CNP has complete authority to establish prices, now must consider impact on CACM. Also consider CACM on import and export.

CACM must each year consider supply, demand and production of CACM countries and establish prices, as near as possible, satisfactory to CACM countries. CNP provides limited technical assistance, handles seeds and, in some cases, underwrites credit provided by the Central Bank to farmers to facilitate production.

Beans: CNP, other than fixing minimum prices and handling imports, presently has little influence on bean production since only about 2.4 percent of production in some years is handled by CNP. Amount of crop handled by CNP varies from year to year.

Minimum price supports since 1953 have varied from 46 to 65 colones per cwt.

Minimum support rates	1967 - 45
Colones per cwt.	1968 - 65
	1969 - 56.50

Prices raised in January 1970, for the 1969 crop, to 63 colones red beans, 58 colones black beans.

Market prices are usually close to support established by CNP. Credit not available to the desired extent to producers. Virtually no farmers receive credit for bean production.

Rice: CNP influence on rice production and price is substantial. While the situation varies by years, amount of rice handled by CNP is rather large. Est. CNP handled about 40 to 45 percent of rice production in 1968. CNP estimates handled 15 percent for 1969.

Minimum price supports since 1953 have varied from 63 colones per cwt. to 68 colones per cwt. in 1963 and 1968.

Minimum support rates	1967 - 63
Colones per cwt.	1968 - 68
	1969 - 60 62.40 with sacks

CNP purchases increased as support rates and imports increased.

Market prices to farmers are usually close to support established by CNP.

Price support level best at about 60 colones per cwt.

Borders now closed to rice imports.

Corn: CNP does not handle enough corn to influence corn price to a great extent. Amount of corn handled varies by years depending on amount of crop production. Price and corn imports have some effect on production and prices to farmers.

Minimum price support since 1953 varies only 22 colones per cwt. to 24 colones per cwt. except 1953 and 1968, it was 26 colones per cwt.

Minimum support rates	1967 - 24
Colones per cwt.	1968 - 26
	1969 - 23.5

Market prices are usually close to support rates.

Grain Sorghum: CNP does not handle a great deal of sorghum grain and production is rather small. Minimum support rate has some effect on production. Support rates on grain sorghum in relation to corn have been too high in some years. Support rate of 18 colones per cwt. is about right.

Minimum support rates	1966 - 23
Colones per cwt.	1967 - 23
	1968 - 21
	1969 - 21
	1970 - 18

A review of support prices and market prices indicates market prices usually close to support rates. Price support rates for grain sorghum, corn and beans seem to be at about proper level.

Support rate for rice appears to have been too high in some years. Price support rate for rice should be about 60 colones per cwt. Support rates should be established in advance for various local markets based on grain standards. Local price should include deductions for transportation and deductions for grades.

The farmer would know in advance what his local support price would be, based on the grade of the crop. Many farmers resent discounts due to quality. If varying grades were established it might be more desirable to establish minimum support prices on a lower grade, then pay premiums on high grades rather than discount because of lower grades. Under a premium system, farmers might make a greater effort to condition grain for premium benefits.

6. Credit for Warehouses, Farm Storage, Dryers and Related Facilities

Many farmers need to sell crop as soon as possible after harvest because of need to pay-off loans or need for money.

With proper warehousing law, farmers could obtain receipt on stored grain, use receipt for security for warehouse loan based on support rates. Maturity dates of loans should be established on loans. Farmers could pay-off loan anytime prior to maturity date and sell grain. Loans not paid at maturity date would be turned to CNP. CNP would then take possession of grain.

Farm Stored Grain Loans

Storing their grain on the farm might be more desirable for some farmers than bringing it to commercial warehouses. Problems would be proper farm storage facility, obtaining correct grade of grains, possible loss of grain by spoilage or removal of grain, rodent and insect damage, lack of drying equipment and risk of loss of secured grain for other reasons. Farm stored loans might be tried out on test basis.

- (1) Loans on farm stored grain would need to be supervised and poultries checked frequently for conditions of grain being stored.
- (2) Farmers authorized for farm-stored loans should be selected.
- (3) Prior to making loan, facility should be checked and grade of grain and conditions should be determined to be satisfactory.
- (4) Any loss of quantity or quality would be assumed by producer.
- (5) Loan should be based on quantity, grade and local loan rate; amount of loan should be limited to not more than 80 percent of the value of the grain based on quantity, grade and local support rate.
- (6) CNP would settle loan on basis of quantity, grade and local rate at time of delivery. If grain is not satisfactory grade, based on grain standards at time of delivery, CNP would not accept grain. Farmer and CNP would then agree on disposition of grain. Farmer would assume any loss of loan.
- (7) A provision could be made for CNP to assume all or part of any loss on secured grain if loss due to cause beyond control of producers, such as fire or flood.

Service fees should be charged to producers to cover at least part of the cost of operating both warehouse and farm stored loan programs. A minimum fee would be charged and added fees charged on the basis of quantity of grain under loan. Farm stored fees would be greater than warehouse due to added supervision and inspection.

Dryer Loans

Loans for drying equipment should be made available to farmers and/or farmer cooperatives. Drying equipment would reduce loss of grain due to high moisture and avoid trucking of high moisture grain. Fees should be charged for making loans to cover part of cost of operating the programs. Loans should be for three year period.

Facility Loans

Loans for farm-stored grain facilities would be desirable. Farm-stored facility loans should be usually of 3250 bus. capacity and metal. The use of smaller bins lends to more multi-purpose type storage. Loans should be for a 5-year period. Fees should be charged to cover part of cost of operation of program.

7. Crop Insurance and/or Credit on Loans when Crops Lost

Some type of crop insurance or credit towards payment of loans is needed when crops are lost due to causes beyond the producer's control. Crop insurance program is now being developed. Small farmer's major source of corn and bean production need relief the most.

If crop insurance is used, insurance should not exceed the cost of production of the crop. A form of credit on loans might also be considered such as waiving 1/2 of the loan debt and spreading balance of unpaid loan out over a 5-year period. Both type programs would require supervision. Fees or premiums should be charged producers. For at least the first few years both programs would need to be subsidized by the Government. Programs could be handled through banks or other credit institutions.

8. Production and Marketing Information Program

A good production and marketing information program should be developed and released through extension service and other sources. Market and production news would help farmers know what production methods should be used and what to expect on market conditions and price trends.

A regular scheduled radio program to release market and production information should be established by the Extension Service and cover:

- (1) Credit sources and how to obtain
- (2) Land preparation
- (3) Need to obtain good seed
- (4) How to treat and test seed germination
- (5) Weed and insect control methods
- (6) Methods of harvesting and drying
- (7) Marketing and current prices
- (8) Crop loans if available
- (9) Other appropriate data.

To make this program effective the Extension Service needs to work closely with other agencies including CNP and private sector. Current research data should be used.

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